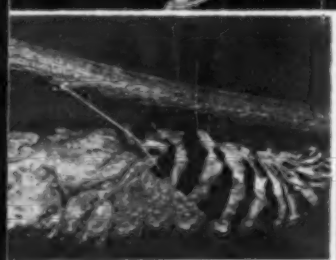
AGRICULTURAL CHEMICALS



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Fertilizer-Herbicide Mixtures

Drift of Pesticides

Barter in International Trade

Fertilizer Consumption in England

Herbicide Sales

Colorado Association Meets

Construction Begins For Ortho Plant

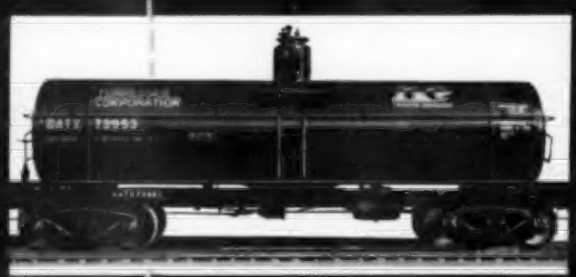
Midwestern Agronomists Convene

CUSTOM APPLICATION SECTION

March 1961

TENNESSEE CORPORATION

SULFURIC ACID



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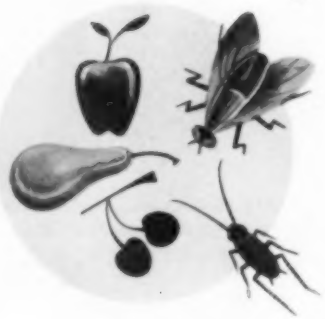

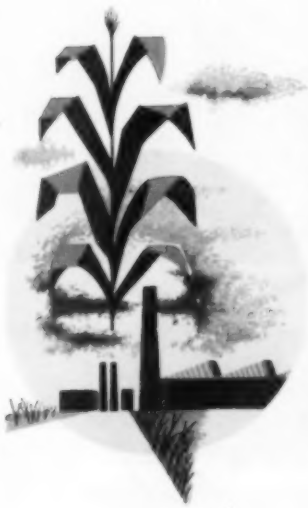

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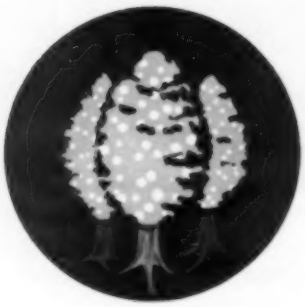

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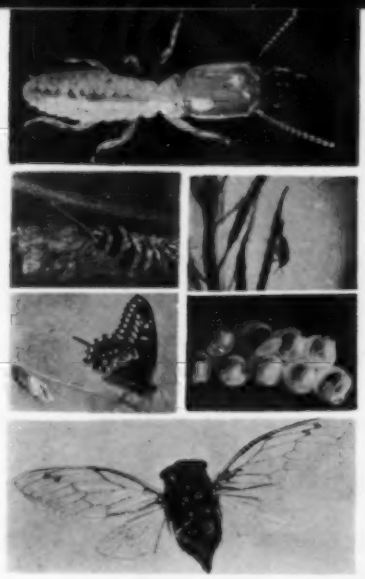

This Month's Cover

Six insect photos are shown as representative of the excellent photography represented at the Insect Photographic Salon of the annual meeting of the Entomological Society of America. Photos at top and bottom are the work of Ray R. Kriner, chairman of the Photo Salon. Photos at left center are from one of the two grand prize winning exhibits. They were taken by Robert Strindberg. Photos at right center are by Alvah Peterson, the other grand prize winner. See page 96 for description of prize winning photos. Conclusion of ESA meeting report is on page 43.

AG CHEM

Vol. 16, No. 3 March, 1961

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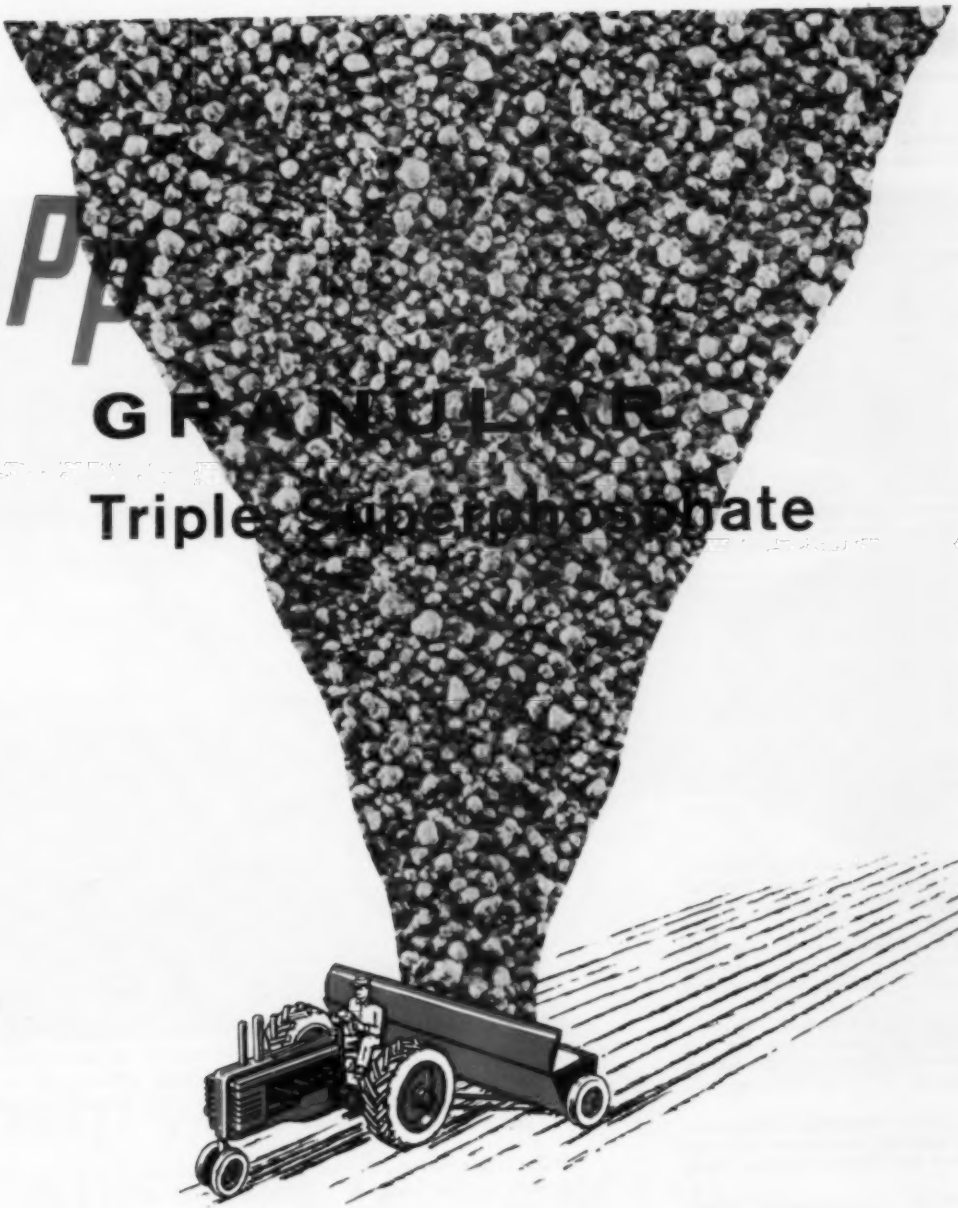

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MEETING CALENDAR

Mar. 3 — Mid-West Agricultural Chemical Association, Omaha, Nebraska.

Mar. 13-15—Spring Meeting, Western Agricultural Chemicals Association, Disneyland Hotel, Anaheim, Calif.

Mar. 21-30 — 139th National Meeting, American Chemical Society, St. Louis, Mo.

Mar. 22-24 — North Central Branch Meeting, Entomological Society of America, Hotel President, Kansas City, Mo.

Mar. 27-28 — California Fertilizer Conference, Kellogg-Voorhis Campus, California Polytechnic College, Pomona.

June 9-17 — European Congress of Chemical Engineers and ACHEMA Congress 1961, Frankfurt am Main, Germany.

June 11-14 — Annual convention, National Plant Food Institute, The Greenbrier, White Sulphur Springs, W. Va.

June 27-29 — Twelfth Annual Fertilizer Conference of the Pacific Northwest, Marion Hotel, Salem, Oregon.

July 19-21 — Southwest Fertilizer Conference and Grade Hearing, Galvez Hotel, Galveston, Texas.

Aug. 27-Sept. 1 — Annual Joint Meeting of Biological Societies, Purdue University, Lafayette, Ind.

Sep. 3-8 — 140th National Meeting, American Chemical Society, and National Chemical Exposition, Chicago.

Oct. 9-10 — Four-State Applicators & Chemical Conference, Chinook Motel and Tower, Yakima, Wash.

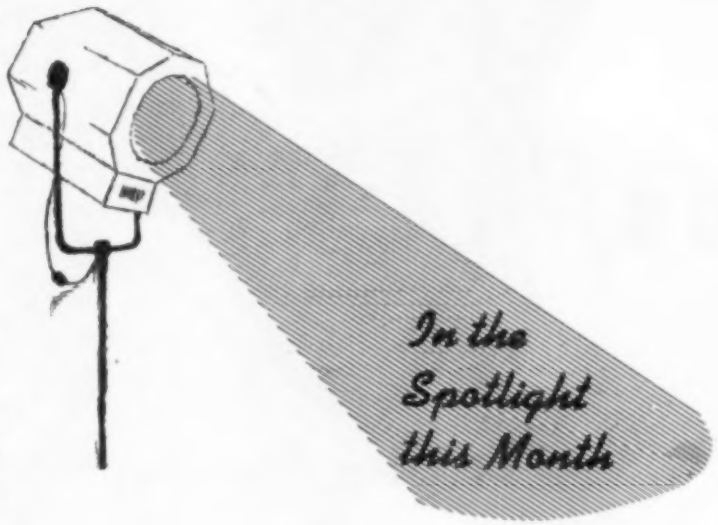
Oct. 23-25 — Entomological Society of Canada, Entomological Society of Quebec, Joint Meeting, P.Q., Canada.

Oct. 29-Nov. 1 — National Agricultural Chemicals Association, 28th Annual Meeting, The Homestead, Hot Springs, Va.

Nov. 2-3 — Pacific Northwest Plant Food Association, annual convention, Hotel Gearhart, Gearhart, Oregon.

Nov. 6-7 — Annual Weed Conference, Washington State Weed Association, Chinook Motel and Tower, Yakima, Wash.

Nov. 12-14 — 38th Annual Convention of California Fertilizer Association, Jack Tar Hotel, San Francisco.



● **Fertilizer-Herbicide Combinations** . . . A recent development which has been studied over the past season, and which may see more application in the field this year, is the use of combination liquid herbicide-fertilizer products. There are, of course, numerous problems connected with the idea and a variety of comments have been received from observers in the field. Page 28.

● **Barter** . . . American firms engaged in international trade are just learning the refinements of the international barter technique that has been revived by European and Asian nations since the end of World War II. Among the factors are promotion of barter by Russia and the emergence of new nations which often have currency problems. Page 32.

● **Drift of Pesticides** . . . A study of drift and residues and the possible hazards they present has been prepared by an authority in the State Department of Agriculture in California, where drift is particularly serious because of the wide variety of crops grown in close proximity. Page 34.

● **Herbicide Sales** . . . An illustration of the type of searching analysis that must be taken by marketing managers who attempt to effectively guide their products in today's competitive markets is presented. Among the factors which must be considered are the overall market activity and the activity of competitive products. Page 44.

● **Fertilizer Round Table** . . . The conclusion of *Agricultural Chemical's* four-part report on the 1960 meeting of the Fertilizer Industry Round Table. Preneutralization as an effective step in fertilizer production is discussed by a panel comprised of representatives of the fertilizer industry. Page 38.

● **New Ortho Plant** . . . Construction of one of the world's largest fertilizer plants has begun at Fort Madison, Iowa. Being built for the Ortho Division of California Chemical Company, the plant represents the largest single investment yet to be made in a fertilizer operation. Page 31.

● **Annual ESA Meeting** . . . The benefits derived from the use of pesticides are outlined at the annual meeting of the Entomological Society of America. Also discussed are quarantine activities and insect detection. Conclusion of a three-part meeting report. Page 43.

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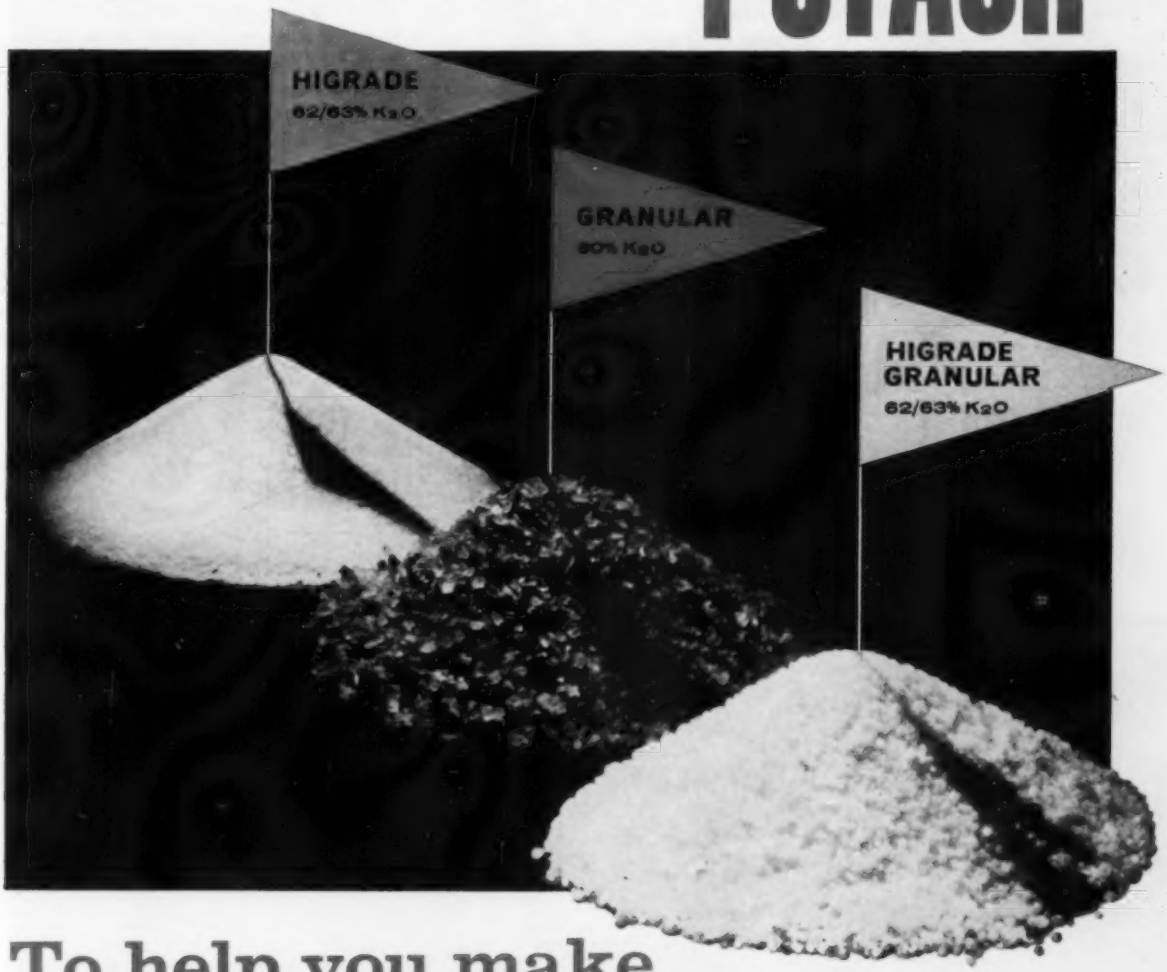

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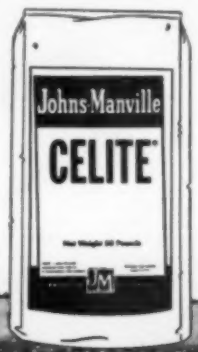

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To The Editor:

Your editorial on ineffective insecticide application, in the February issue of AGRICULTURAL CHEMICALS, is well taken. In the beginning, the new so-called miracle chlorinated hydrocarbon insecticides were so effective that operators became careless and failed to make correct applications. As a result, operators often get poor control and in many cases "insect resistance" is given as an excuse.

The fault is not lack of assistance from industry. Industry and other sources have provided funds and scholarships, and for those really interested in education, there is plenty of financial assistance available. We need more students interested in education and fewer who are simply looking for "hand-outs".

In a recent television interview, Doctor Morgan, President of Rose Polytechnic Institute, made a significant statement. It was as follows: What we need is more for education and less for fringe benefits, What he meant by fringe benefits, I believe, are the many things the larger institutions are providing to make their institutions more like "country clubs".

Higher education institutions do not need all the funds they request. They must give more attention to education and use their funds for education and not for the pleasurable activities. A university is for study and education, and not intended as a pleasure resort.

J. J. Davis
Purdue University
Lafayette, Ind.

To The Editor:

In the December issue of *Agricultural Chemicals*, there is an article written by Vincent Sauchelli entitled "Sulfur". We would like to have an estimate as to cost of reprinting 550 copies of this article.

Paul D. Hartmann
Shell Chemical Company
San Francisco, California

To The Editor:

Looking through the January 1961 issue of your magazine, I noticed an article on the Aquatic Weed Society meeting in Chicago, Illinois. My purpose in writing is to obtain the mailing address of the officers to find out a little more about the organization. We have been thinking of setting up a Clinic-type meeting on the problem of weeds in lakes and ponds.

W. R. Rogan
Waukesha County Extension Services
Milwaukee, Wisconsin

Publicity chairman for the Aquatic Weed Society is Paul W. Eller, who is with the Chipman Chemical Co. at 608 South Dearborn St., Chicago 5, Ill.—Ed.

•

Pesticide Trade Names

Readers have been most cooperative in helping to identify several pesticide products, about which we inquired in the January issue. The following identifications have been received:

Acrolein — an aquatic herbicide by Shell Chemical Co., New York.

Napchlor — A pentachlorophenol pre-emergence herbicide made by Chapman Chemical Co., Memphis.

Napsul — Trade name used many years ago by California Spray Chemical for a lime-sulfur solution. The product is no longer registered for sale.

Trietazine — Experimental herbicide made by Geigy Chemical Co., New York.

Urab — a weed and brush killer; Urox a soil sterilant. Both made by General Chemical Division, Allied Chemical Corp., New York.

CMPP—(also known as MCPP or mecoprop, the British common name) is being widely used in Great Britain, particularly for the control of cleavers and chickweed in cereals. It is a mixture of dextro and laevo-rotatory forms of (2-methyl 4-chlorophenoxy) propionic acid.

We haven't yet succeeded in identifying Buelene—and Will Roemer of Bowling Green, Ky. asks, "What is CD-2 weed spray?"

—Ed.

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Insecticides • Fungicides • Weed Killers • Fertilizers • Defoliants
Adjuvants • Household Detergents and Industrial Cleaning Compounds

Extensive facilities at Richmond, California, for mixing, grinding, blending of dry materials and liquids for bulk sales, custom processing, private label packaging. Extensive research, development and control facilities.

For further information, write

UNITED Heckathorn

600 South Fourth Street, Richmond 4, Calif.
Sales Office: 415 Lexington Ave., New York, N. Y.

Foxboro pH Dynalog Recorder has an input impedance of 80,000 megohms — eliminates the need for intermediate amplification. Span is adjustable from 2-12 pH; zero, from 0-12 pH.

Foxboro eliminates the amplifier from pH recording and control

cuts the drift, cuts the cost, cuts the maintenance, too!

Foxboro pH Dynalog Controller — for use where it is desired to hold pH at a predetermined value.

Foxboro pH Dynalog Indicator — for use where complete record of pH value is not required.

THAT'S RIGHT — the intermediate amplifier is gone from Foxboro's new low-cost system for measuring pH. And gone with it is the wasted panel space, the drift, the daily standardization inherent with earlier systems.

In the new Foxboro system, the signal from the pH electrode goes direct to a high impedance Dynalog* receiver — without intermediate amplification. Signal operates a direct-reading indicator or recorder—or a controller and alarms, when desired.

The new Foxboro pH system is the simplest, most economical method of measuring pH available today. Ask your Foxboro Field Engineer to tell you about it. Or write for data sheet. The Foxboro Company, 133 Norfolk Street, Foxboro, Massachusetts.

*Reg. U.S. Pat. Off.

FOXBORO Analytical Instrumentation

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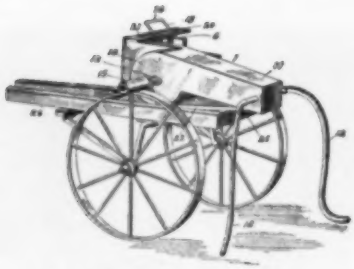
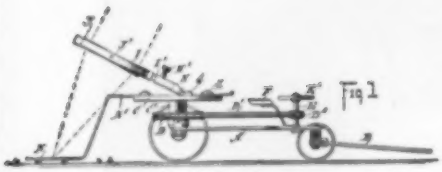
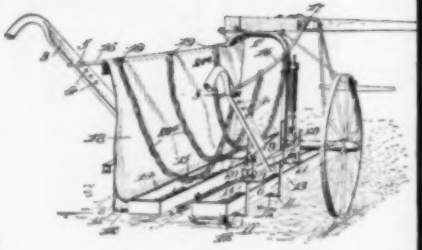
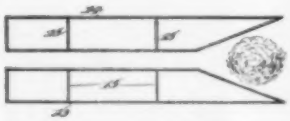


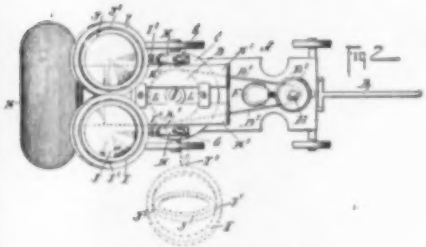
Patented 1900 by Benjamin H. Passmore and Robert B. May, Stockdale, Texas







Patented 1904 by Sanford V. Ivy of Texas

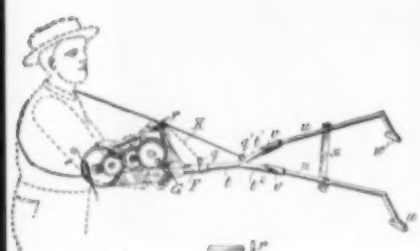


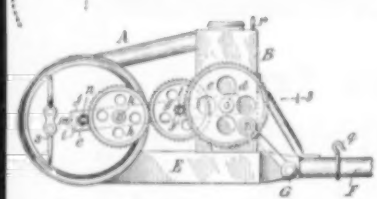
Patented 1898 by Victor Rieke, Franklin, Minn.

THE UNRELENTING SEARCH

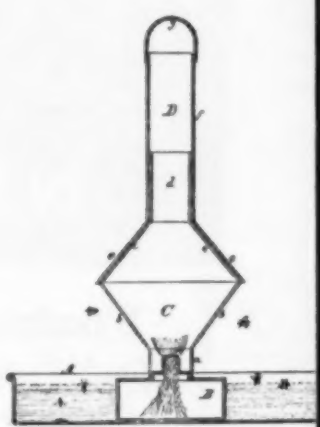
From the day man first cultivated a crop he has made an unrelenting search for a better way to eliminate insect pests. Some of the mechanical devices registered in the U.S. Patent Office for control of boll weevils and other insect pests are shown here. Today insect pest control, unlike that of our forefathers, has advanced to a highly effective science, but the quest for a better way still continues.

Hercules Powder Company has developed toxaphene and Delnav® for crop protection, Thanite® for household sprays, and Metadelphene®, personal insect repellent. Through continuing research, we believe the future will yield still more exciting and effective accomplishments.

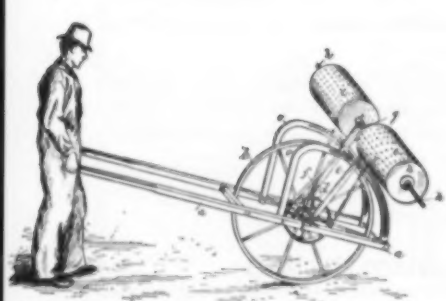




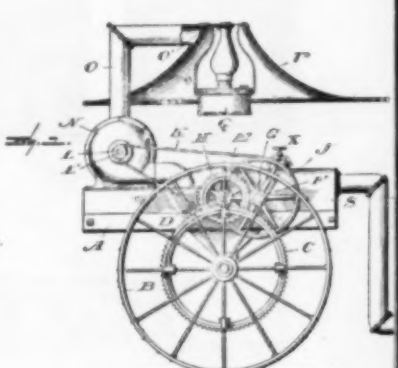
Patented 1909 by Clinton H. Leggett, New York, N.Y.



U.S. Patent No. 109,869 1870



U.S. Patent No. 243,727 July 5, 1881



U.S. Patent No. 640,829 Jan. 9, 1900

Agricultural Chemicals Division

HERCULES POWDER COMPANY

INCORPORATED

Hercules Tower, Wilmington 99, Delaware

8351-19

Patent illustrations from "Saga of Insect Control," *Croplife* Magazine.

Newest member of the Davison team of granulated phosphates...

DAVISON Diammonium Phosphate

MAKES HIGHER ANALYSIS MIXTURES . . . than before—and makes them more easily. 16 units of highly soluble NITROGEN—Plus 48 guaranteed units of AVAILABLE P_2O_5.

FOR DIRECT APPLICATION . . . an exact 1-3-0 ratio—ready to use and sell . . . beautifully granulated.

FOR DRY MIXING . . . Davison Diammonium affords the dry blend manufacturer the advantages of an ammoniation plant. A balanced 1-3-0 ratio simplifies formula calculations.

READY FOR SHIPMENT . . . right now. Make this profitable new phosphate part of your operation. Call Davison in Baltimore today at SAratoga 7-3900.

GRACE

DAVISON CHEMICAL Agricultural Chemicals Division, Baltimore 3, Md.

Some formulations of ratios in higher analysis grades using DAVISON 16-48-0

Ratio Analysis	Pounds of Material Required			
	16-48-0	Ammo. Sul. (21%N)	Triple (46%APA)	Potash (60%K₂O)
1-1-1 14.4-14.4-14.4	602	917		481
1-2-2 11-22-22	917	349		734
1-4-2 8.5-34-17	1063		370	567
1-4-4 6.6-26.5-26.5	828		290	882

******Other higher analysis nitrogen materials (urea and ammonium nitrate) may be substituted in above formulations.* Analysis in the more popular ratios, such as 12-12-12, 10-20-20, 6-24-12, 5-20-20, can be manufactured by the addition of granular dolomitic limestone or other materials.

Control cotton seedling diseases

One application of TERRACLOR®

Terraclor and combination fungicides save cotton . . . save money

The major cotton seedling disease of Rhizoc Damping-Off or "soreshin" is effectively controlled by Terraclor soil fungicide, providing healthy, vigorous stands with the first planting. Terraclor may be combined with certain other fungicides for effective control of disease complexes. Such fungicides are Captan, Thiram, Phygon, Zineb, and Maneb.

Soil-borne fungi such as Rhizoctonia solani, Pythium and Fusarium are responsible for skips and uneven stands or even destruction of entire fields of young plants. When this occurs, replanting is necessary. This can amount to 10-25% of cotton acreage annually.

Terraclor and Terraclor combination fungicides are now accepted as a standard cultural practice in many cotton producing areas . . . proved over more than five years as the effective, profitable way to control cotton seedling diseases.

May we discuss soil fungicides with you or send you additional information? Your request will receive our prompt attention.

OLIN MATHIESON CHEMICAL CORPORATION
Insecticide Products Department, Baltimore 3, Maryland
Fresno, Calif. • East Point, Ga. • Denver, Colo. • Dallas, Tex.

. . . ELIMINATE REPLANTING

Fungicide at planting does it!

1. Eliminates skips 2. Provides better stands 3. Promotes bigger yields

Here's the damage: Every year cotton seedling diseases cost the growers an estimated $70 million . . . destroy about 3 bales for every 100 ginned, or almost 400,000 bales annually . . . cost the growers in seed, time and labor.

Here's the *TERRACLOR* profit picture:

1. Permits earlier planting with greater safety.
2. Provides vigorous, uniform stands with first planting.
3. Insures against replanting costs—saves seed, time, labor.
4. Insures against waste of valuable soil moisture by eliminating replanting.
5. Permits reduction of excessive seeding rates.
6. Develops better root systems.
7. Protects a good stand.
8. Provides healthy seedlings . . . earlier cotton.
9. Permits some boll set before cotton root rot disease attacks in certain areas.
10. Permits earlier harvest . . . and better grade of cotton if harvested before Fall rains.
11. Provides (through uniform, better stands) more efficient mechanical harvesting . . . better weed and insect control . . . more efficient use of plant nutrients and water.

8970

Other Crop Uses

Cabbage, Cauliflower, etc.	Club Root and Black Root or Wire Stem
Tomatoes, Peppers	Southern Blight
Beans	Root and Stem Rot, Sclerotinia White Mold
Peanuts	Southern Blight (Southern Stem Rot)
Potatoes	Scab, Rhizoctonia
Lettuce	Leaf Drop, Bottom Rot
Alfalfa, Clover	Crown Rot
Wheat Seed	Common Smut or Bunt
Garlic	White Rot
Celery*	Pink Rot, Damping-off
Onions	Smut, Sclerotium Rot
Mushrooms*	Mildew, Lipstick Mold
Strawberries*	Botrytis, Black Root, Red Stele
Ornamentals	Stem Rot, Crown Rot, Black Rot, Root Rot, Botrytis, Flower Blight
Turf	Brown Patch

TERRACLOR® is a trademark.

*Experimental use only

HIS BUSINESS IS MAKING YOUR BUSINESS BETTER

He's one of several hundred Cyanamid people who mine, process, research, deliver and service phosphatic materials for your acidulation and mixed fertilizer business. These people put Cyanamid's more than 40 years of phosphate experience into products and services you can use.

Services you can use

Traffic Service: Cyanamid traffic specialists are ready to route and ship your orders without delays. Their knowledge can save you money, and can make your operation run even more efficiently.

Technical Service: Cyanamid's staff of technical experts are constantly at your service. Make your formulation and production problems theirs. That's their job.

Sales Service: Cyanamid sales representatives are available to work with and for you in expanding present markets or in establishing new markets.

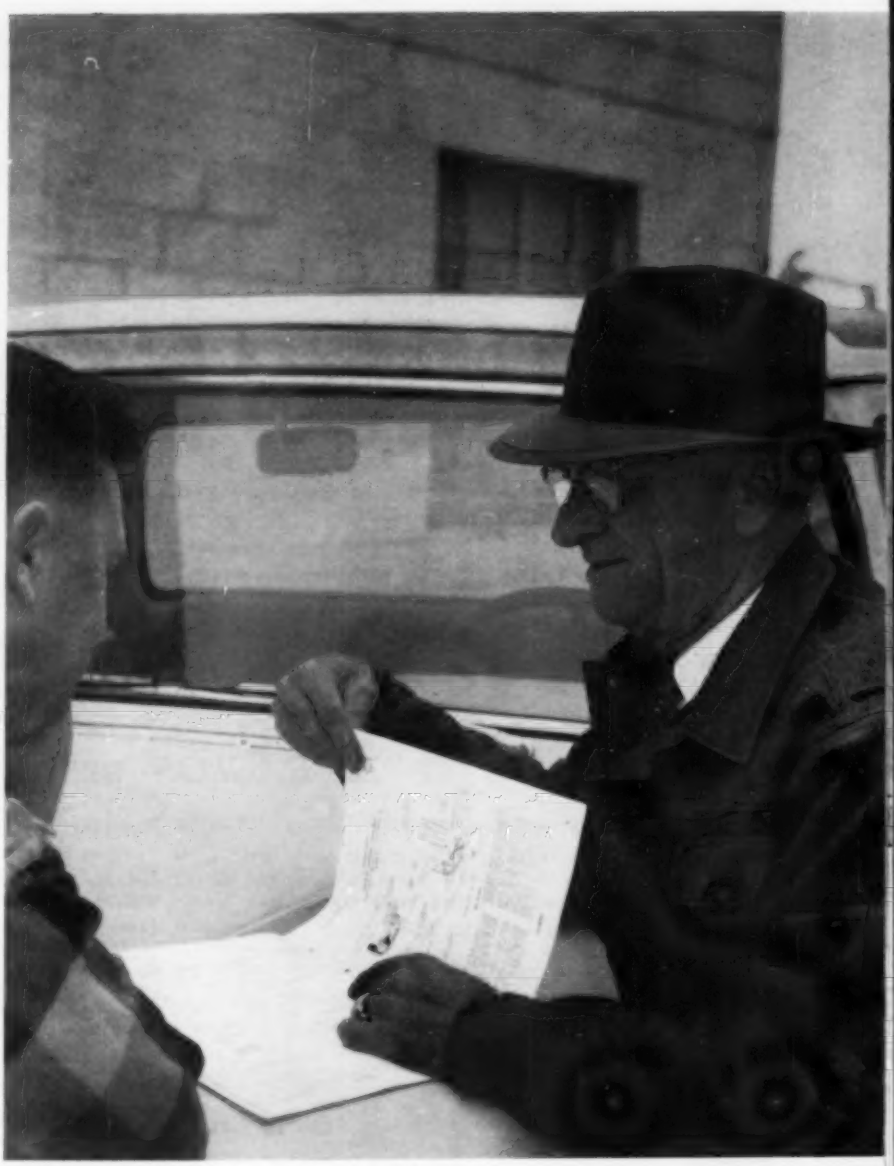
Products you can use

Cyanamid's phosphate business is the mining and manufacturing of the highest quality products for your mixed fertilizer requirements.

- Florida Natural Phosphate Rock.
- TREBO-PHOS® — Triple Superphosphate.
- Phosphoric acid — an economical source of P_2O_5 for high analysis fertilizers.

American Cyanamid Company, Agricultural Div., N. Y. 20, N. Y.

®TREBO-PHOS is American Cyanamid Company's trademark for its triple superphosphate.



Cyanamid Technical Service Representatives, skilled in all phases of fertilizer manufacture, are available for on-the-spot consultation. Take advantage of their experience.

CYANAMID

PHOSPHATE PRODUCTS

CYANAMID SERVES THE MAN WHO MAKES A BUSINESS OF AGRICULTURE

EDITORIALS

AT a meeting held last month in Chicago, attended by state control officials, agronomists and fertilizer manufacturers, steps were taken to implement a uniform policy on the labeling of plant foods, which would be effective in a thirteen state area in the north central region of the United States. The essential feature of the new policy is that minimum levels are set up which must be met by those offering fertilizers for sale before they can claim any beneficial effects to plants from application of the materials.

These minimums are established, in percentages, (see pg. 36, 37 for details) for the fifteen primary, secondary and trace nutrient elements. It is further provided that these elements must be present in "available" form, an element being considered available if the form in which it is present has been proved to give plant response, or if the element can be dissolved from the fertilizer in water or some other solvent which will make it available to plants.

It is a bit hard to realize that, at this late date in the history of fertilizer regulation, such a measure as this should still be needed, — but it is quite apparent that it is. Cases have been reported where ground granite was sold as fertilizer to home gardeners and other uninformed laymen. The mineral content was there, but not in available form of course. In another such instance dried Louisiana swamp soil was sold in Wisconsin as a plant food on the basis of its small content of trace elements. Actually there was a higher percentage of the trace elements in the soil to which it was applied than in the so-called plant food.

If fertilizer buyers can be imposed upon in this manner, obviously a more stringent and uniform labeling policy needs to be adopted. It will, incidentally, in addition to protecting the fertilizer buyer, also protect the vast majority of fertilizer manufacturers and mixers who sell a legitimate product.

* * * * *

ADDRESSING the recent convention of the National Canners Association, Dr. Emil Mrak told canners, food producers and pesticide manufacturers that they have a big task on which they must work together in getting the true facts about the country's food supply before the public. He warned, however, that most of the material that has been published on the subject has been drab, boring and uninteresting, and not read with anything near the interest the public accords the sensational pronouncements of those writers who warn them that they are daily being poisoned by pesticides.

We concur fully with this suggestion from the Chancelor of the University of California. And, to implement it, we would suggest that some of the basic producers of pesticidal chemicals, who are in many cases big advertisers in the slick paper magazines, devote some of their future copy to showing a few million consumers what the food supply situation would be without pesticides. The first advertisement in the series could be a basket of wormy, blotchy apples (circa 1902) before modern pesticides and fungicides had come into general use.

The shock value of such a series would, it seems to us, do more than most anything else to actually persuade the consumer that he has a heavy personal stake in modern pesticide usage.

In Experimental Stage

Fertilizer-Herbicide Combinations Meeting With Mixed Reactions

A development which has been studied over the past season, and which possibly may see more application in the field this year, is the use of combination herbicide-fertilizer products. Still in the experimental stage, the idea is met with mixed comments. A major advantage, of course, is the elimination of an extra trip through the field.

Some observers feel that the introduction of such a product may create more problems than are solved. A number of factors enter into the successful use of either a fertilizer or a herbicide when applied individually and it might be a difficult task to adjust conditions so that both materials will be applied under the most favorable circumstances.

COMBINATIONS of insecticides and fertilizers have found increasing use in American agriculture over the past five or six years, in spite of a relatively cool attitude toward such mixtures on the part of many fertilizer manufacturers. The problem of dispersing a relatively small quantity of pesticide thoroughly and uniformly through a large bulk of solid fertilizer material is one with which the average fertilizer manufacturer is not always fully prepared to cope. This factor has been a strong one in holding back the idea of the combination product. Also, incorporation of a toxic material like insecticide in a fertilizer brings the mixer automatically up against safety problems, inherent in the handling of a toxic material, and also the necessity for registration of his combination fertilizer-pesticide under the Pesticide Act, which understandably he would prefer to avoid.

Nevertheless, sale and use of combination fertilizer-pesticide products have grown over the past few years, because of the interest of the user in such products and his demand for them. Application of a combination product offers the obvious advantage of saving an extra trip through a field, and with labor cost being such an important factor, this has been a compelling argument in support of use of the combination product. Many fertilizer mixers, grudgingly perhaps, have come around to the idea of offering such products. The growth in popularity of liquid fertilizers, incidentally, has accelerated the trend toward the combination product. A pesticide emulsion can readily be combined right in the field with a liquid fertilizer solution, with no problems of caking, deterioration, etc.,

and with much more flexibility than with a solid product.

Another new development which has been studied over the past season, and which may possibly see more application in the field this year, is the use of combination liquid herbicide-fertilizer products. The idea is still essentially in the experimental stage, and there are not only numerous problems in connection with the idea, but mixed comments as to whether or not the introduction of such a combination product may not create more problems than will be solved. One observer who has had lengthy experience in the herbicide field comments, in reply to a query from the editors of *Agricultural Chemicals* as to the practicality of such combination products:

"I look on this combination fertilizer-herbicide mixture spraying with mixed emotions. To my knowledge, it has been tried in the wheat country of the Pacific Northwest quite extensively; also to a limited extent it has been used on corn in the Carolinas, particularly North Carolina. Problems arise from incompatibility of the liquid fertilizer and the common 2,4-D herbicide formulations. Also, the job is a rather ticklish one if you are to get full benefits from both the fertilizer and herbicide without inducing crop damage.

"Some proponents of this spray combination promote it enthusiastically. The truth is, I believe, in the hands of an experienced applicator, one who understands both the mechanical and the chemical aspects of the job, there are benefits to be derived. But in the hands of the average farmer, however, I am personally timid about what would happen."

One individual who reports having had considerable experience with combination fertilizer-herbicide mixes out in the wheat country of the Pacific Northwest comments that, while some success was encountered, there were numerous problems. In a number of situations, because of temperature or other factors, incomplete mixes were obtained and "salting out" occurred. In one test application, using aqua ammonia and 2,4-D esters, considerable plant injury resulted. He concurs with the idea that, in a crop like wheat, such a combination product might well be a two-edged sword in the hands of an inexperienced operator. There are a number of factors, he points out, that enter into the successful use of either fertilizer or herbicide, when applied individually, and it is obviously a difficult task to adjust conditions so that both materials will be applied under the most favorable circumstances.

In the hands of an experienced applicator, one who understands both the mechanical and the chemical aspects of the job, there are benefits to be derived from the fertilizer-herbicide combination. The average farmer, however, cannot be expected to achieve the same results.

The use of fertilizer-herbicide mixes on turf, however, he believes is quite a different and much more practical matter. It is possible, he points out, to successfully incorporate not only a fertilizer and a herbicide in a combination product for lawn treatment, but an insecticide as well. A product widely used in Southern California employs as its combination of ingredients sulfate of ammonia, lead arsenite, and chlordane.

An aerial applicator reports that when applying 2,4-D sprays they often add a small amount of nitrogen fertilizer to the 2,4-D to accelerate plant up-take of the combination product, and thus make the herbicide act more rapidly and effectively.

Another herbicide specialist who has kept closely in touch with developments in the mid western area reports that there was a substantial demand for herbicide-fertilizer mixtures in this area last season, particularly for use on turf. He predicts a rather big expansion in the market for the 1961 season, suggesting that there may be a fairly substantial volume of business done this season in the application of liquid fertilizer solutions along with formulations of 2,4-D and 2,4,5-T esters in improving thousands of acres of grazing land.

A basic producer of herbicides concurs in this observation, and reports:

"There is a strong interest in these mixtures, and because of this interest, we have been doing considerable work along these lines. We do not know of any herbicide emulsifier at this time which will do the type of job that is desired. That is, offer a homogeneous mixture of fertilizer and 2,4-D without continuous agitation.

"Obviously, separation of these two would give spotty application of one or the other and with a result of either spotty weed control or plant nutrition or both. Most of the good 2,4-D formulations on the market today will mix with various liquid fertilizer solutions. They are satisfactory for use, providing the spray tank has a continuous agitation system of one kind or another. We keep looking in hopes of finding an emulsifier which will preclude the necessity of the agitation, but we have no bright prospects in mind at the present."

An emulsifier manufacturer observes that they are "quite interested in the potential in this field." They developed one particular emulsifier specially for use with mixtures of liquid fertilizer and toxicants. It did an excellent

job of emulsifying such combination products, they report, but some mistifying problems involving stability were encountered.

"We stopped pushing sales of the product until our research men had a chance to check into it. Now it would seem that we have solved the problem, but we want to conclude all tests positively before we make any statements. We don't want to risk our reputation by announcing success prematurely. We might never sell a dime's worth later on if we made the big brag prematurely."

They indicate that they have not actually run any full scale tests on this emulsifier involving 2,4-D as yet, but had been stimulated by *Agricultural Chemicals'* inquiry to start such tests. "In view of the variety of other materials with which we have worked successfully," they observe, "we see no problem with 2,4-D which would not yield to a solution."

Considerable opinion from the field, however, concurs with the idea that the emulsifier problem has by no means solved even for straight herbicides, let alone combination products. Says one observer, "We experienced considerable difficulty in 1959 with certain wettable powder pre-emergent weed killers for use on corn. It was necessary in some cases to completely rebuild some sprayers, because many spray tanks do not have a continuous agitation system. And there is a wide difference in the efficiency of some of these agitation systems.

"I have had considerable experience in attempting to mix a small amount of pesticide uniformly into a sod fertilizer. In spite of maximum effort on our part to make a good uniform mix, this proved practically impossible. And the same difficulty has been reported by others who have tried it."

By the very nature of the factors involved, it seems highly probable that, if a solution is found to the idea of a combination fertilizer-herbicide, it is more likely to be found in a liquid rather than a solid formulation. A liquid formulation, for one thing, more readily allows the dispersion of a small amount of toxicant (insecticide or herbicide) in a large volume of product. One of the problems of mixing a small amount of pesticide in a solid fertilizer is non-uniform dispersion, traceable to non-uniformity in particle size,—too large a particle size of the fertilizer as compared with the micron-sized particles of pesticide.

Solid fertilizer does not normally require the fine milling or mixing that is essential for combining it with pesticides, and the manufacture of a "combination" product adds to the production problems of the manufacturer of solid fertilizer. With a liquid mixture, solution presents no problem.

There is another point favoring the liquid product which should not be overlooked. Occasionally a farmer will order a combination fertilizer mixture, perhaps incorporating with it an insecticide or a herbicide. After the fertilizer has been mixed and he has taken delivery, perhaps his crop plans change because of weather, cannery contracts or other factors beyond his control. The fertilizer mixed with the pesticide is useless for the new crop he has in mind. If his combination fertilizer-pesticide is a dry product, he is out of luck. But a liquid would not be mixed until immediately before application, which preserves this additional flexibility of decision for the user.

Apart from the physical factors involved, there are also psychological factors which suggest that a liquid product may be the answer to farmer demand for combination products. To begin with, the firms which have built a growing market for liquid fertilizers over the past few years are more disposed than are the mixers of solid fertilizers to consider new ideas and new product types. Theirs is a dynamic business built around the idea of change, for they are already selling a new type product to replace the solid fertilizers which in the past have been the historical product type. As long as they are selling a new product type anyhow, they have little reluctance to add still another new form of their product. In this attitude they are unlike the bulk of the sellers of solid fertilizers who are operating on a "status quo" basis in an established industry.

In the final analysis, product types can be expected to change with the times,—and must certainly change if buyer demand changes. With so many of the farmers of the present day looking for anything that will offer more efficient production through reduction in man hours spent on the job, the combination fertilizer-pesticide products, including the latest innovation, fertilizer-herbicide combinations, would seem to offer promise for the future. And it looks as if they will be marketed by the aggressive, forward-looking type firms that are not necessarily wedded to the idea of doing business the way they have done it in years gone by.★★

With farmers looking for more efficient production through reduction of man hours spent on the job, the use of fertilizer-herbicide combinations would seem to offer promise for the future since product types must change if buyer demand changes.

At Fort Madison, Iowa

Huge Ortho Fertilizer Plant Under Construction

A new Ortho fertilizer plant will be one of the world's largest and represents the largest single investment yet to be made in a fertilizer operation. Production capacity will exceed 1,000 tons per day of plant food, including anhydrous ammonia, prilled ammonium nitrate, and pelleted complex plant food in various formulations.

CONSTRUCTION of a fertilizer plant for the Ortho Division of California Chemical Company is under way near Fort Madison, Iowa.

Grading and compacting of the site, a 419-acre stretch bordering the Mississippi approximately two miles southwest of Fort Madison, has been completed by Cameron-Joyce Company, Keokuk, Iowa, and completion of the major buildings is scheduled for late this year.

The new Ortho plant will be one of the world's largest and represents the largest single investment yet to be made in a fertilizer operation. Production capacity will total more than 1,000 tons of plant food per day, including anhydrous ammonia, prilled ammonium nitrate and pelleted complex plant food in various formulations.

The site is served by both Santa Fe and C.B.&Q. railroads, and an access road from U.S. Highway #61 will make truck transportation convenient. The area is well-serviced by truck lines and the Mississippi provides a water route. Natural gas in the vast amount needed for ammonia production will be supplied by the North Central Public Utility from the Michigan-Wisconsin Pipe Line.

The Bechtel Company are contractors for the ammonia plant which will synthesize hydrogen derived from natural gas and nitrogen from air to produce anhydrous ammonia at the rate of 300 tons per day.

The nitric acid plant will follow a Chemical and Industrial Corporation design, similar to those built for the Ortho fertilizer operations in Richmond, California, and Kennewick, Washington.

This design is a modification of the duPont process of burning ammonia and absorbing the oxides under pressure. Air is supplied by a centrifugal compressor driven by a steam turbine. An expander, operating on heated tail gas, is used to recover the energy in the waste gas from the process.

Liquid ammonia from ammonia plant storage tanks is vaporized and superheated and fed into a mixer with the air stream from the air heater. The mixture of heated air and ammonia enters a converter and burns on a platinum-rhodium catalyst. The hot mixture of nitric oxide, water vapor, oxygen and nitrogen leaves the converter through an exchanger which heats the waste tail gas for use in the power recovery turbine to permit maximum economy, and passes on to an air heater where filtered compressed air attains the proper temperature for combustion of ammonia.

A waste heat boiler, located in the hot gas stream, produces process and heating steam in excess of the plant requirements. This, combined with the power recovery turbine, makes the nitric acid plant self-sustaining.

Cooling and oxidizing of the combustion gases (changing NO to NO_2) takes place in a multi-pass, horizontal cascade-type cooler. The acid condensed in this cooler is delivered to the proper plate in the absorption column. Uncondensed gases enter the base of the absorption column and flow upward, countercurrent, to water (steam condensate) which is used as the absorbing medium. The acid in the base of the absorption column is swept by a stream of hot air or

(*Continued on Page* 88)

Aerial view of the plant site shows its accessibility by rail and highway from its location on the Mississippi River. Natural gas for ammonia production is to be supplied from the Michigan-Wisconsin Pipe Line. Insert shows the location of the plant, midway between Burlington and Keokuk, Iowa, on the Mississippi.

Oldest Trading Practice

BARTER

EXPERIENCING INTERNATIONAL REVIVAL

Barter transactions, one of the oldest means of facilitating international trade, seem to be on the increase and have for the past several years helped American fertilizer manufacturers to participate in the world market.

Pesticide manufacturers may have a great deal to learn and gain from study of the refinements of this oldest trading practice, in which long established trade procedures often are disregarded by a wholly new breed of world trader.

BARTER, the oldest known method of exchange, is far from extinct in international trade. In fact, despite the prevalence of international loans, the World Bank, reciprocal trade agreements and the many devices of recent years designed to assure freer and fuller trade among nations, barter and its twin, the clearing account, seem on the increase. American firms engaged in international trade, unlike their European counterparts, are just learning the refinements of the international barter technique. International Ore & Fertilizer Corporation, familiarly known as Interore, has succesfully engaged in international barter transactions since the early postwar years.

According to Ronald Stanton, vice-president of Interore charged with barter negotiations, it was the exigencies of the postwar years which led to the revival of barter. Japan was among the countries anxious to acquire foreign currency and credits as quickly as possible at the end of World War II, and as late as 1960 entered into a barter agreement with South Korea which, in exchange for fertilizer, shipped Japan large quantities of laver, a seaweed considered a delicacy in the East, as well as large shipments of salt and rice. With Mexico, Japan entered into a similar agreement, exchanging fertilizer for salt and cotton. Other countries entering into such agreements did not so much increase their foreign trade as they pinned down a segment of the market for their expendable surpluses. Mexico gained considerably, however, under the Japanese barter arrangement, because it was able to ship cotton to Japan in excess of that which was permitted by the normal Japanese import quota.

Similarly, Greece, in its stride to postwar recovery, definitely increased the foreign market for its surplus products by its selective bargaining. It would enter into only normal trade agreements with Western countries, but did agree to barter with the Iron Curtain countries to dispose of its surplus oranges and tobacco in exchange for fertilizers. If, as sometimes happened, these countries paid a premium for the fertilizers furnished, they felt themselves repaid by the benefits they thought they realized from this controlled trade.

In this period, out-and-out barter agreements did not have a monopoly on this so-called "controlled trade." Clearing accounts on a bi-lateral basis performed a similar function. Whereas with barter agreements no money changed hands, the bi-lateral clearing accounts provided that each signer of a contract would agree to purchase a stated quantity of the other's products during a given time. At that time, any balance remaining in favor of one nation could be settled with either the payment of cash or orders for additional products. Often this imbalance called for ingenuity to solve. One recent transaction, for example, involved four nations. Country A owed Counry B money on a bi-lateral agreement and, on a similar agreement, B was in debt to Country C, while Country C was in debt to Country D. A barter deal physically moved fertilizer from Country A to Country D but, in the process, involved both Country B and Country C as buyers and sell-

ers, thus, on paper, wiping out the successive debts of the several nations under their bilateral agreements. Not only had the trading agent resuscitated the barter agreements which had come to a standstill, but it had made its own transaction possible and received cash for its fertilizer.

Two things among those responsible for the current revival of barter and the bi-lateral clearing account are: the promotion by Russia and the other members of the Communist bloc of this means of international trade; Second is the great number of "emerging" nations which often have currency problems, a situation in which "controlled trade" has the greatest appeal.

Some of these bi-lateral barter and clearing account transactions have been profitable for the non-Communist nations; others have produced unforeseen problems. When the agreements were carried out in truly bi-lateral manner – with the Communist bloc countries absorbing all the products furnished by the non-Communist country, the latter seldom had cause to complain. But when the Communist bloc failed to absorb all the products, they often found their way to world markets at a discount to compete with the very country which had entered into the agreement to keep these products off the world market through "controlled trade" with a few nations. One of the earlier bi-laterial agreements entered into by Russia was with Egypt by which Russia agreed to take a large portion of the Egyptian cotton crop in exchange for arms and other Communist-bloc products. The crop proved to be greater than could be absorbed by the Communist-bloc countries and the surplus was offered on the world market at cut prices to the detriment of any other transactions into which Egypt might have entered. Some of the cotton, as a matter of fact, was bartered for, or used to procure fertilizer, which was then supplied to Egypt at a price above that which it would normally have paid. A similar unhappy situation occurred when Burma bartered rice for cement and the surplus rice was sold competitively in world markets.

But – profitable or not – the coming years will see an increase rather than decrease of barter and controlled trade. The firm seeking international trade will have to enter into these agreements or be precluded from participating in procurements. There are many difficulties attendant upon completion of barter agreements. Many of these stem from the fact that preliminary negotiations are conducted over an extended period. Thus, in arranging to barter fertilizer for, let us say, hides, the trading agent must bring its crystal ball into play to determine the likely value of the fertilizer at an indeterminate future date and must also take into consideration such incidental costs as packaging and ocean freight. The agent also has to estimate the value of the hides when the agreement is in effect—no easy task when commodity markets often reflect changes daily. If the agreement is not pure barter, but a clearing account transaction which is ultimately settled by a cash payment, the value of the currency becomes a consideration. Not only must the hazards of devaluation or revaluation be weighed, but the ordinary daily fluctuations which can amount to several percent of a transaction's total and often spell the difference between profit and loss. Also, when a barter transaction reaches the point where agreement seems reasonable, the agent must ask its suppliers – the fertilizer producers – to earmark parts of their production to fulfill the terms of the agreement. If the agreement ultimately falls through, the trading agent then has an obligation to help the producers dispose of these stocks which have been kept off the market at its request.

One of the features of the revival of the oldest method of trade is the emergence of a wholly new breed of world trader. Not that speculation per se is wholly new in international trade. But the speculator usually had in mind some commodity for which he sought a buyer. Now he ranges the world seeing who has surplus of what, and where he can barter it for somebody else's surplus commodity. He often disregards established trade procedures and his penchant for anticipating a situation can create chaos among the regular elements in international trade.

Because the economies in the Iron Curtain countries are state controlled, with political objectives taking priority over profit and loss considerations, they have been in a very advantageous position in barter trading. In order to compete with the Communist countries, the free world must rely on independent trading organizations such as Interore, which will compensate differences in price, ocean freight rates, etc. in each individual case. Notwithstanding the advantages enjoyed in barter trading

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Among factors responsible for the current revival of barter and the bi-lateral clearing account are the promotion by Russia and other members of the Communist bloc of this means of international trade and the great numbers of "emerging" nations which often have currency problems, a situation in which "controlled trade" has great appeal.

DRIFT

of Pesticides

Drift of pesticides can cause trouble in many ways. It can present hazards to people, livestock, bees, fish, wildlife, and crops. The problem is especially important in California where a wide variety of crops are grown side by side.

This article is from a report by Robert Z. Rollins, Chief, Bureau of Chemistry, California Department of Agriculture, that appeared in the California Department of Agriculture Bulletin, Vol. XLIX, No. 1, pages 34 to 39.

DRIFT of pesticides causes trouble in many ways. It may present a hazard to people, either as an actual threat to their health, or as an annoyance or worry to them. Even drift of sulfur dusts into a house, drift of spray onto laundry hanging on a line, or drift of any kind of dust into a subdivision or over a highway can cause many complaints, and there are indications that air pollution control may be increasingly concerned with application of agricultural pesticides.

Drift of some pesticides, such as parathion or TEPP, can present a serious hazard to people. This type of accident, however, is uncommon. Drift is probably not a very serious hazard with most pesticides, but many people do not know this, and a frightened and indignant person may cause more trouble than an injured person.

Drift may present a hazard to livestock. Although livestock are only rarely injured severely by pesticide drift, owners of livestock may attribute lack of weight gain, reduced milk production, abortion, or some other difficulty to such exposure, and this situation can cause as much trouble as more obvious bodily injury. Even if the animals are not injured, contamination of meat or milk might occur.

Drift presents a hazard to honeybees and other beneficial insects on neighboring crops or flowering weeds. A farmer who has bought and released parasites to protect his crop can be understandably upset when drift of DDT into his trees wipes out the insects he has carefully employed and depended upon.

Drift also presents a hazard to fish and frog farms. There have been several cases in California in recent years where drift of Toxaphene or other similar pesticide has caused expensive losses in ponds where market fish, goldfish, or frogs were being raised.

Drift presents a hazard to wildlife. Several years ago in California the careless application of Dieldrin to rice fields caused widespread alarm where the chemical drifted onto and drained into irrigation ditches and killed spectacular numbers of carp.

Drift presents hazard to crops. It may damage the crop itself, as in drift of 2,4-D or other herbicides and defoliants, or in drift of sulfur onto melons, but the hazard to crops which has become of most importance in recent years is the possibility that drift may impart a persistent residue in or on the marketed produce. This situation can be disastrous in the marketing of fruits and vegetables, particularly where a zero tolerance or no tolerance has been established for that particular residue on that particular crop.

A particularly difficult problem is presented by the drift of pesticides onto feed and fodder crops and pasture. The amounts of materials involved in such drift rarely affect the health of livestock but residues on such feed can contaminate the fat of meat animals or the milk or dairy animals. Tolerances have been established for several pesticides in the fat of certain meat animals, so drift onto their feed may not be a serious problem unless is occurs close to the time the animals are slaughtered. The big problem surrounds milk.

It has long been known that some pesticides ingested by dairy animals can seriously contaminate their milk. For example, DDT, BHC, Chlordane, Aldrin, Dieldrin, Endrin, Heptachlor, and Toxaphene all pass from the feed of the animal into their milk and can be readily detected and determined shortly after the cow has eaten even a trace of the chemical. Methoxychlor is an exception in having a threshhold value and small levels in the feed do not appear in the milk. In general, the organic phosphates do not present so great a hazard of contamination as the DDT group.

The dairy cow is as efficient a concentrator of DDT as is the analytical chemist. Apparently most of the DDT and similar pesticides eaten by the cow are distributed in the body fat and milk of the animal. Paradoxically, body fat and butter fat can have a higher concentration of the pesticide than the feed that the animal is eating. For instance, when feed contained 0.1 ppm Dieldrin, the body fat and butter fat contained 0.3 ppm. Furthermore, once a dairy cow's body has been contaminated, it may take a long time of feeding on clean feed before the contaminant disappears from the body fat and milk.

Unfortunately, hay and fodder are not readily identifiable by tags or lot numbers so all lots on the market must be fit for all uses. In other words, they must contain no detectable amount of contaminants unless and until appropriate tolerance has been established. Although it may seem odd at first thought, the lettuce that we eat may contain 7 ppm DDT, for example, while the hay that a dairy cow eats can contain none — not even a trace, if milk is to contain no trace.

Contamination of feed resulting from pesticides deliberately applied directly to a crop grown for feed seems unlikely. Growers know the hazards of such application and can avoid practices that impart a residue. The most serious danger comes from operations of their neighbors. The contamination of fodder is particularly a problem in many areas of California where cotton and other field and vegetable crops are grown near alfalfa and other feed crops or pasture. These other crops might need to be treated with pesticides several times during the season but no detectable amount of the pesticide can be tolerated on the adjacent field or feed. This brings up the problem of drift.

How far do pesticides drift? Even though a plane flies low over the ground as it releases a spray or dust, the violent and complex turbulence of its passage through the air lifts some of the material 10 to 20 feet above the level that the plane flew. The small particles then settle, and the trouble is that they settle very slowly, more slowly than is commonly realized. How far they drift depends upon particle size, height of plane, and velocity of the wind. The longer a particle takes to fall to the ground, the longer it is borne along by the air flow. Warm convection currents may increase the range of drift by repeatedly lifting the fine particles or impeding their fall.

"Aircraft dusting and the concept of zero tolerances for a number of pesticides on a number of crops will find it difficult to coexist in many of the areas of diversified farming in California. Increasing restrictions seem inevitable."

Much of an insecticidal dust is in particles ranging around 10 microns. A good aircraft spray has particles greater than 100 microns. Consider, for example, pesticides of dust or spray dropping 10 feet in an air movement of three miles per hour. This small air movement is almost imperceptible. It is not enough wind to move a wind vane, but in dropping 10 feet in such an air movement, a 100-micron particle drifts 50 feet. A 10-micron particle drifts one mile, a 5-micron particle three and one-half miles, and a one-micron particle drifts 84 miles. Double the wind to a modest six miles per hour, or stir the dust up to 20 feet, and the particles will drift twice as far.

It is difficult to bring the concepts of drift and residue together because so many variables are concerned. There is an important difference between drift and deposit, or drift and residue. All the material that crosses the customer's fence is drift. A portion of this deposits on the neighbor's property and the remainder drifts across the neighbor's property and on to deposit in decreasing amounts on successive properties down wind perhaps for many miles.

We are essentially not interested in what drifts over a field and perhaps not even directly interested in what settles on the field, but we are interested in the amount of the pesticide chemical that becomes part of the crop harvested from the field. It doesn't require a large amount of drift to cause a problem. For instance, one teaspoonful of DDT drifting onto 5 acres of alfalfa puts one ppm in the hay, and the law says that the hay must contain none.

All of the foregoing indicates that aircraft dusting and the concept of zero tolerances for a number of pesticides on a number of crops cannot coexist in many of the areas of diversified farming in California. Increasing restrictions seem inevitable. They may come from city, county, state, or federal regulations. They may come from prohibitive insurance rates. They may come from increased civil damage suits. In any event, the

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Left to right: (top) J. A. Heineck and Joe Whittington, Olin Mathieson Chemical Co., and Frank Nelson, Rath Packing Co. (bottom) Richard E. Bennett, Farm Fertilizer Inc.; J. D. Stewart Jr., Federal Chemical Co.; Paul T. Truitt, NPFI, and John W. Hall, Potash Co. of America

(top) Dr. Ralph Young, North Dakota Agricultural College, and Dr. John T. Pesek, Iowa State University. (bottom) John R. Taylor Jr., John Deere Chemical Company, and H. R. Albrecht, Pennsylvania State University.

(top) Dr. Marvin Beatty, U. of Wisconsin; Dr. Gordon Ryder, Ohio State; Dr. John Pesek, Iowa State; and Dr. L. E. Engelbert, U. of Wisconsin. (bottom) Dr. Everett Rogers, Ohio State, Dr. H. R. Albrecht, Penn State; and Dr. M. B. Russell, University of Illinois.

Joint Midwestern Meeting

Agronomists Discuss Soil Tests, Labels

"ALL soils are not equally suited to intensive use for crops," observed Dr. Marvin Beatty, University of Wisconsin, at the 13th annual joint meeting of Midwestern Agronomists and Fertilizer Industry Representatives, held February 15, 16 at the Edgewater Beach Hotel, Chicago. "Only a limited number of soils are capable of giving high yield responses to intensive management," he continued, pointing out that "As the use of land becomes more intensive, the properties of the soil are an increasingly important factor."

"Low yields of crops can be produced on a great many soils, but only a limited number of soils are capable of giving high yields in response to intensive management. Results of a 100 bushel corn growing contest in Crawford County showed this clearly," reported Dr. Beatty, as he offered the following data:

Soil type	Av. corn yield bu./A.
Fayette silt loam	110
Dubuque silt loam, deep phase	91

The corn on these fields was grown under uniform conditions, except for the difference in soil type.

"These are two of Wisconsin's better corn growing soils. On a shallower phase of Dubuque silt loam, which is very extensive, our measurements would indicate that only 70 bushels per acre can be

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produced under the same kind of management. Whether a given set of inputs produces 70 bushels per acre or 100 bushels per acre is very important to farmers. It is also important to you in the fertilizer industry. Such differences can mean the difference between a good customer who buys fertilizer each year and a farmer who is disappointed with his yields and blames it on the fertilizer he used.

"Soil surveys can provide much information which will be helpful to farmers in setting realistic yield goals. These surveys can also help in the evaluation of the fertilizer sales potential in an area."

Dr. Beatty said that maps and reports from soil surveys can show the locations of soils responsive to various intensities of management. These maps, he pointed out, can help locate areas having high potential for increased use of fertilizer.

"Good measurements or estimates of yields are a must for a sound farming program, he declared. "If farmers are going to adopt new fertilizers and management practices, they need to know how much it will increase their yields."

Extension-Industry Cooperation

ALSO commenting on the importance of adequate soil testing were agronomist Gordon J. Ryder, and economist Everett Rogers, both of Ohio State University.

In discussing results of the Miami County (Ohio) program, they said:

"We found that soil testing is the key step in securing a change in farmers' attitudes toward fertilizer use. Attitudes do not seem to affect fertilizer use among farmers who test their soils.

"However, there is a strong relationship between attitudes and the use of fertilizer among farmers who do not test their soils. This finding suggests that soil testing may be one method of cancelling out the influence of negative attitudes toward fertilizer."

Left to right: Z. H. Beers, NPFI; Dr. R. L. Cook, Michigan State University; and Dr. M. B. Russell, University of Illinois.

Ryder and Rogers reported that on the basis of soil test analyses in Miami County and the state of Ohio, Miami County farmers at present are using only 36 percent of the nitrogen, 38 percent of the phosphate and 40 percent of the potash they could apply, if every cropland acre was fertilized according to soil test recommendations.

"For the state of Ohio, conservatively figuring," they said, "farmers are using about 52 percent of the nitrogen, 36 percent of the phosphate and 40 percent of the potash they could profitably apply."

Discussing fertilizer needs, Dr. Pesek said: "The main feature of fertilizer needs for continuous corn is additional nitrogen. Our most recent estimates show that about 80-120 pounds per acre annually would be needed if corn were grown continuously on soils of average fertility. Subsequent work

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A Uniform Policy for Labeling Plant Foods in the North Central Region

At the meeting, February 14, which was attended by agronomists and state control officials from each of the thirteen states and by representatives of the fertilizer industry, a uniform policy for the labeling of plant foods in the North Central Region was discussed and agreed upon by the state officials and state agronomists. It is intended that the plan be ratified by each of the states and that appropriate regulations or other action under the state laws will be pursued to bring the plan into effect in all states on July 1, 1961, or as soon as possible thereafter. The uniform policy includes the following points.

1. State officials will require guarantees at minimum levels, in percentages, of all available nutrient elements for which claims of beneficial effects to plants are made in any form or manner. The fifteen elements and the minimum amount of each which may be guaranteed in the labeling of any plant food product are as follows.

	Percent	*ppm*
Primary		
N	1.00	10,000
P	0.40	4,000
K	0 8	8,000
Secondary		
Ca	1.00	10,000
Mg	0 50	5,000
S	0 50	5,000
Trace	*Percent*	*ppm*
B	0.01	100
Cu	0 01	100
Zn	0 02	200
Mn	0 05	500
Fe	0.10	1,000
Mo	0 001	10
Co	0.001	10
Cl	0.10	1,000
Na	0.10	1,000

An element is considered "available" if the form in which it is added to the product has been shown to give plant responses or if the element can be dissolved from the product in water or in some other solvent which is recognized to indicate availability to plants.

2. Each of the fifteen elements, when claimed, is to be guaranteed in the form of the element, except phosphorus and potassium which are to be guaranteed as the element or as the oxide or both. A statement of the equivalent guarantees for phosphorus and potassium as the elements is to be encouraged, but not required.

3. Warning statements are to be required on the label for plant food products which contain more than .025% boron in a water-soluble form.

4. The use of such all-inclusive terms as "balanced" and "complete" in the labeling of plant food products is not to be permitted unless the label shows the intended meaning of the term.

Preneutralization:

AN EFFECTIVE STEP IN FERTILIZER PRODUCTION

The economy of a preneutralizer for conventional fertilizers results from the use of a larger proportion of nitrogen solutions and ammonia. A preneutralizer, however, is not a "cure all," and should only be considered by plants where technical help is above average, and present practice of granulation well under control.

PRENEUTRALIZATION can be used to advantage in several phases of ammoniation-granulation work, reported R. D. Young, of TVA, in outlining preneutralization studies at TVA. "Removal of a large part of the water, and dissipation of much of the heat of reaction in a preneutralizer can be very beneficial in: (1) allowing use of more economical formulations for several conventional grades of granular fertilizer; (2) improving production and decreasing recycle requirements for special types of granular fertilizers, such as the inverse ratio grades, (20-10-10 etc) and X-O-X grades (16-0-16 etc.) (3) new process applications such as the TVA process for production of granular diammonium phosphate."

Mr Young spoke at the 10th fertilizer Industry Round Table Nov. 3 to 5 in Washington, D. C.

The reaction equipment is comparatively simple and inexpensive,—and control is not too difficult, observed Mr. Young. "We do not feel, however, that a preneutralizer is a 'cure-all' or should be considered for use in all plants, even though savings due to cheaper formulations are indicated. There is some additional complexity in control, another piece of equipment to operate, and another potential source of difficulty. Probably only those plants where technical help is above average, and where practice of granulation is well under control, should consider use of preneutralization."

From the left: N. K. Alfrey, W. R. Grace & Co.; G. R. Gilliam, Allied Chemical Corp., Nitrogen Division; H. Garrett, Minute Maid; G. C. Marburger, Spencer Chemical Co.; and R. D. Young, TVA.

The preneutralizer used in TVA studies was a tank 14" x 3½' high, equipped with two turbine-type impellers on a single shaft, driven by a variable speed air motor. The spargers were drilled-pipe type of ¼-inch size. Gravity flow was utilized from the preneutralizer to the ammoniator.

Studies indicated that a nominal retention time of 6 to 10 minutes in the preneutralizer tank was satisfactory. Surface area for evaporation of water and volumetric capacity for ammonia loading are of considerable importance. TVA reports good results with evaporation rates as high as 300 pounds of water per hour per square foot of surface. For large-scale design, they suggest that not more than 200 pounds per hour per square foot be used. Ammonia loading of 35 to 50 pounds of ammonia per cubic foot of preneutralizer liquid per hour, advised Mr. Young, has been satisfactory.

Correct proportion of reactants is one of the main concerns of control in the preneutralizer. Temperature in the preneutralizer has a pronounced effect on loss of ammonia, on fuming, and on the amount of evaporation obtained and the final moisture content of the preneutralizer slurry. A convenient means for control of temperature, is through addition of water directly to the tank for evaporative cooling. Usual range of control of temperature is 250-275° F.

"The type of distributor that we have had the most success with is our so-called 'saw-toothed' distributor, reported, Mr. Young. It is a section of 1½-inch stainless steel pipe closed at one end, with a serrated slot along one side. The preneutralized slurry flows by grav-

ity into the open end of the pipe, and the stream is divided into a number of individual streams that drip onto the bed of material in the ammoniator. This distributor provides a fairly good pattern, but difficulty due to the individual streams of slurry combining in contact with the wall of the pipe has been experienced." This problem has largely been overcome, he said, by positioning the saw-toothed slot an inch or so outboard from the wall of the pipe.

Another type distributor which shows much promise uses compressed air impinging on a stream of slurry flowing from an open-end pipe. For some slurries the cooling effect of the air is too great, and causes too rapid crystallization of the material with resultant lumping.

The economy of using a preneutralizer for conventional fertilizer grades results from use of a larger proportion of nitrogen solution and ammonia. Good results in plant scale operation have been reported for 12-12-12 grade with all nitrogen from solutions. In TVA pilot plant experiments with X-O-X fertilizers, formulations were based on preneutralization of nitric acid with ammonia to produce high analysis grades, ranging from 16-0-16 to 20-0-20. All these grades, said Mr. Young, were produced with all of the nitrogen supplied as nitric acid and ammonia. The granules were particularly well rounded, very much resembling prills, and had good storage properties when a coating agent was used.

In the TVA process for using a preneutralizer for DAP grades, the slurry is very thick at an NH_3:H_3PO_4 mol ratio of about 1 and becomes increasingly fluid as the ratio is increased to about 1.5. Loss of ammonia increases rapidly as the ratio approaches 1.5. TVA used the highest ratio that could be used without excessive loss of ammonia; this ratio was in the range of 1.25 to 1.35, showing a pH of 5 to 5.5 when wet-process acid was used. If acid more concentrated than about 42 per cent P_2O_5 was used, sufficient water was added to the preneutralizer to give an effective concentration of 40 to 42% P_2O_5. The temperature in the preneutralizer was about 250° F., and the effluent slurry contained 18 to 20% water. DAP grades 21-53-0 with electric furnace acid and 18-46-0 with wet-process acid, as well as complete grades such as 14-35-14 and 18-18-18 were produced. Recycle ratios ranged from 1:1 to 3:1. Without a preneutralizer the recycle requirements would have been much higher.

Actual Production Experiences Told

Experience with preneutralizers at commercial plants offers invaluable information for industry. In installation, vertical-type, insulated slurry line; check valve on acid line; and vacuum breakers are suggested. In making high nitrogen grades, fines recycle is used to control liquid phase instead of water since it is not possible to vary water.

GRANT C. Marburger, Spencer Chemical Co., described the preneutralization equipment installed in the fall of 1958 at the Omaha plant of Farm Fertilizers, Inc. The equipment has been used to produce 8,000 to 10,000 tons of fertilizer during the past two seasons. "This experience creates some worthwhile information on the preneutralization process that will be of value to the rest of us in the mixed fertilizer industry," advised Mr. Marburger.

In the granulation operation at Farm Fertilizer's plant, raw materials are screened into a cluster hopper and weighed into a scale hopper. This mixture is elevated and conveyed to a feeder that meters it into a TVA type ammoniator granulator, 6′ in diameter x 8½′ long. From the granulator the material drops into a 5′ x 32′ dryer and then into a second dryer, 6′ x 35′, which is alternately used as a cooler. Exit this vessel, it is elevated into a small cooler 5′ in diameter x 15′ in length.

A double deck product screen is used exit the cooler. The oversize from the screen falls to a chain-mill type crusher and is returned to the screen. The fines are collected in a large recycle hopper from which they are removed by a gravimetric feeder and fed into the TVA ammoniator at a controlled rate.

The preneutralization equipment consists of a tank 5′ in diameter and 7′ high. Preneutralized slurry flows by gravity into the ammoniation section of the TVA ammoniator-granulator. The cost of equipment when originally installed included $1100 for the tank, $600 for the mixer, and $130 for the temperature indicator and capillary. Total installed cost (including flow meter, piping, valves, etc) was between $3000, and $4000.

Mr. Marburger suggested that future installers of preneutralizers should make the slurry line as vertical as possible, with no horizontal or relatively flat sections. "These," he said, "contribute to excessive surging in the flow of slurry to the ammoniator. Insulation placed on the slurry line also seems to help this problem, reducing surging in the flow when dumping the preneutralizer at the end of a run.

"Some methods of stopping reverse flow in the acid and solution lines to the preneutralizer is needed. During a momentary shutdown, pressure was lost on the sulfuric acid tank. The acid control valve did not shut off tight enough, and the backflow of acid to the sulfuric acid tank siphoned slurry up out of the preneutralizer. This, of course, solidified and was very difficult to get out. Check valves have been installed on the acid line at Omaha. Vacuum breakers might also be practical."

Four major grades are produced by Farm Fertilizers, using

the preneutralizer, and a considerable tonnage, said Mr. Marburger, has been run of the grades 16-20-0, 15-15-0, 15-15-15 and 20-10-5. All of these grades have been run at 15 tons per hour, remarked the speaker, but 12 tons per hour—he said—works better. The 15-15-0 formula frequently is varied by substituting ammonium sulfate for one or two units of nitrogen solution. It's hard to operate with 15 units of the nitrogen solution, because the large quantity of normal superphosphate in the formula necessitates a lot of the nitrogen solution going into the TVA ammoniator or into the preneutralization tank.

When speaking of production rates obtainable with preneutralization, one penalty should be mentioned, cautioned Mr. Marburger. A delay of approximately one hour is encountered in order to get the tank filled, so an hour of production time is lost. The grade 20-10-5 runs well using as high as 19 units of ammoniating solution. The production rate is 10 tons an hour on this formula, with recycle ratio estimated at less than 1:1. Overformulation of one unit of nitrogen is presently used. Although this formula runs satisfactorily, the product doesn't store too well. Part of this may be due to the lack of sufficient cooling capacity at the plant, observed Mr. Marburger. The granules are soft and a wet crust will form over-night on top of the pile.

For goods less than 20 units, more trouble is experienced on mechanical condition in storage than was previously encountered before neutralization. However, in grades having more than 20 units, such as 16-20-0, 15-15-0, and 15-15-15, the increase in ammonium nitrate content resulting from increased use of solutions does not create problems. If any hot material is bagged, however, trouble will be encountered.

Water is used as a control of temperature in the preneutralization tank. Temperature is held in the range of 275°-300°F. on the four grades produced. Although it is possible to use water as a control of liquid phase in the granulator, this practice is not used at the Omaha plant. Mr. Marburger explained that this is because in the high nitrogen grades produced, the removal of moisture is difficult, since very little heat can be used in the dryer. Thus, adding water as a control becomes prohibitive. At the same time, control has to be close because granulation will swing quickly from dry to wet in this operation. Therefore control is achieved by the alternate method of controlling fines recycle. Equipment to better accomplish this has recently been modified at the plant.

Acidity control is also used extensively at the plant. Acidity will affect degree of granulation, amount of fumes created, and hygroscopicity in the product pile. pH samples are used as an overall check of operations.

Contrary to early estimates, cold weather has not proved to be an operating hazard with preneutralization. The overflow line has plugged several times and will do so if the plant is shut down for about an hour. The slurry cools off in this length of time and the pipe rapidly becomes cold. The operators have learned, however, that the addition of water to the slurry helps prevent this trouble.

Recent Prereactor Improvements Noted

In the use of a prereactor, when working with low nitrogen grades, start-up operations seemed difficult. The addition of a separate sparger, however, permitted the by-passing of the prereactor with a small amount of acid to solve the problem. The by-pass is used only when needed to aid granulation, and to prevent internal clogging from wet process phosphoric acid.

DISCUSSING some recent improvements in the concentric pipe prereactor, N. K. Alfrey, W. R. Grace & Co., Washington Research Center, reported that use of this unit has virtually eliminated ammonium chloride fume cloud, and reduced nitrogen losses from the ammoniator granulator.

The prereactor is a continuous flow sparging system which was described at the 1959 Fertilizer Industry Round Table. Its use has been quite successful at the Davison Curtis Bay Maryland plant, reports Mr. Alfrey—and tests there have shown that all of that plant's usual fluids required in the granulation of any of their grades could be prereacted. This included 60 and 66° Be sulfuric acid, electric furnace phosphoric acid, nitrogen solution, anhydrous ammonia and water. (Water is used only as needed for granulation control).

Mr. Alfrey observed, however, that at another plant installation, difficulty in prereacting wet process phosphoric acid was encountered. Its use caused internal clogging of the discharge pipe. Also, with the low nitrogen 1-4-4 ratio grades, the prereactor caused startup operations to be more difficult. An analysis of the problem showed that the prereactor neutralized the sulfuric acid so efficiently that only steam, hot salts, hot water, and ammonia were left to aid the granulation. This was entirely adequate in most instances; however it was not adequate for rapid startup leveling out with the high potash grades. A small amount of sulfuric acid was needed to compensate for the cold equipment and materials during the startup.

This need, coupled with the problem of internal clogging from using wet process phosphoric acid, led to the change in the design of the prereactor. A separate acid sparger has been added, which permits bypassing the prereactor with a small amount of the acid. This bypass is used only when needed

(*Continued on Page* 90)

1960 Sets Record

Fertilizer Use Rising In United Kingdom

Consumption of nitrogen in the United Kingdom topped 400,000 tons during 1960, a rise of about one-fifth, to set a new mark. The use of phosphate and potash also increased during the crop year. The outlook for 1961, however, is not so bright because of poor weather experienced last summer and autumn.

1960 was a record year for fertilizer usage in the United Kingdom. Consumption of nitrogen for the first time topped 400,000 tons in one fertilizer year, a rise of about one-fifth. Also used were more than 480,000 tons of phosphate, a similar rise; and over 420,000 tons of potash. A report in the January 14 issue of *Chemical Age* indicates that this growth rate was exceptional.

Looking ahead to 1961, however, the report quotes Sir Clavering Fison of Fisons Ltd. as saying that general conditions are not as buoyant as last year when good agricultural conditions prevailed during the 1959 summer and autumn. The 1960 summer and autumn were marked by "appallingly bad" agricultural weather,. This autumn, the report states, has brought a huge shortfall in ploughing and cereal-sowing, with consequent reduction in autumn fertilizer demand. It remains to be seen how much of this will be made up for by extra spring cereal sowings, and indeed whether the fertilizer industry can fully cope with what is likely to be a record spring demand.

Among reasons cited for the exceptional usage of fertilizer in fiscal 1960 are the expanding use of fertilizers on grassland and lower fertilizer prices. Another influence is the rise in nutrient content of compounds. Although farmers, when using the more concentrated fertilizers tend to reduce rates per acre, they do not always reduce rates to the mathematical equivalent of previous rates with less concentrated products. Compound fertilizers are estimated to account for 75 per cent of all fertilizers used in England.

During the year a study by O.E.E.C. dealt with the gaps between actual and optimum use for many countries. In this study, optimum use was defined as the application of maximum rates that would show profit to all the various crop or grass acreages of a country, taking into account the then current prices of fertilizers, crops, and utilized grass output. The study indicates that the United Kingdom now is using 57 per cent of its optimum amount of nitrogen, 90 per cent of optimum phosphate, and 75 per cent of optimum potash.

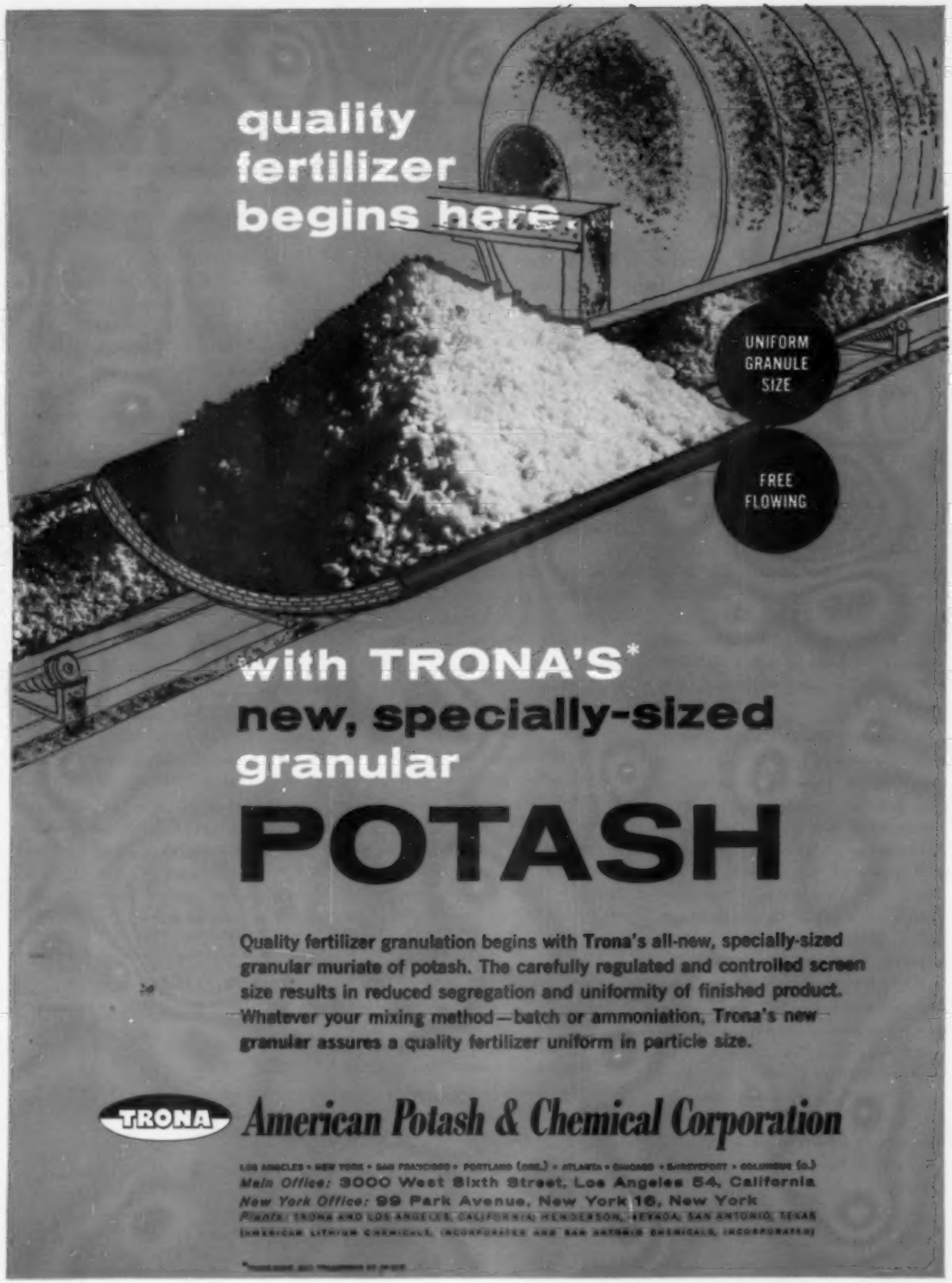
Among other countries included in the survey, several were considerably closer to optimum use of nitrogen, e.g., Belgium at 68 per cent, Denmark 64 per cent, West Germany 73 per cent, Iceland 76 per cent, Netherlands 71 per cent, and Sweden 71 per cent. The United Kingdom was as close to optimum phosphate use as any other country except Holland, who was exceeding her optimum rate, the study disclosed. For potash, several countries also were ahead in their closeness to optimum use; Belgium 91 per cent, Denmark 79 per cent, West Germany 81 per cent, Netherlands over 100 per cent.

Also conducted last year was a social survey among grassland farmers in the United Kingdom dealing with their attitudes towards new methods, including that of fertilizer use. The survey showed that 23 per cent of grassland farmers used no fertilizers; another 17 per cent used only basic slag and/or lime, i.e. no N or K; 60 per cent used straight fertilizers (other than slag) or compounds. The non-users were asked why they ignored fertilizers. The collated replies are shown in the accompanying table.★★

OPINION POLL OF GRASSLAND FARMERS

Reasons for non-fertilizer use	% of farmers
Unnecessary/land rich enough	30
Sufficient farm manure for use	19
Gave land plenty year before	14
Too costly/cannot afford fertilizers	7
Prejudices against fertilizers, e.g., starves the ground, fails to give good results	5

Reasons for not using 'twice as much'	% of farmers
Amount used enough/more not needed	50
Waste of money/could not afford it	15
Better to give small doses more often	11
Various answers indicating view that extra use would harm grass, animal health, etc.	13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Human Welfare Benefits From Pesticides

USDA extension workers last year advised more than one million farmers on the proper use of insecticides. Furthermore, their efforts in this direction are being stepped-up even more as new and more potent insecticides come into use.

"THE United States food supply is the safest, cleanest and most wholesome of any food supply in the world," observed Gerald H. Huffman, deputy administrator of USDA's Federal Extension Service, who credited the use of agricultural chemicals as an important factor in America's unique food supply. Mr. Hoffman spoke at the annual meeting of the Entomological Society of America, Nov. 28 to Dec. 1, at Atlantic City, N. J.

He said: "The gigantic task of counseling farmers on how to use pesticides and other agricultural chemicals in a manner which will increase production efficiency and at the same time assure wholesome, healthful food products for consumers, is in large part an educational assignment.

"Since insecticides are widely used chemicals which must be applied with recommended precautions, it is understandable that our nation's extension entomologists stand out as key people in the educational job of helping farmers produce residue-free food through exact recommendations as to kind of insecticides to use, on what crop, in what amounts, and at what times."

Mr. Huffman revealed that last year alone extension workers advised over a million farmers on the proper use of insecticides. The Extension Service is also teaching safe handling and use of pesticides through the 56,700 boys and girls enrolled in 4-H entomology projects.

Mr. Huffman asserted that extension entomologists had been working on the problem of assuring residue-free food "long before the cranberry episode of a year ago brought the use of agricultural chemicals into the limelight." However, he added: "Their efforts in this direction will be stepped-up even more in the future as new and more potent insecticides come into use."

A program to help hungry people of the world feed themselves was advanced by M. J. Jones, ESA president and extension entomologist for the U. S. Department of Agriculture's Federal Extension Service, who suggested that a "gigantic extension entomology program be established to teach the hungry people of the world to wrest the food they need from the insect hordes."

Speaking to 700 fellow entomologists, Mr. Jones declared that at least 30 per cent more calories and "unpredictable" nutritional values could be added to the diet of these people through proper insect control practices alone. He said the only way people in tropical areas can have food is to beat the insects to it. And he added that in many countries the harvest goes to the insects rather than to the people.

Insect control workers may have to face their greatest challenge in the years ahead when new tillable lands are no longer available to increase food production for a rapidly growing population in the U. S., remarked Emory D. Burgess, of USDA's Agricultural Research Service.

Insects, diseases, nematodes, and weeds are estimated conservatively to reduce the value of farm and forest production in the U. S. by more than $10 billion, Mr. Burgess reported. Among the most damaging of these pests are the cotton boll weevil which causes $100 to $200 million in damage yearly; the European corn borer which does $80 million in damage annually; and stem rust diseases of cereals that cost about $50 million a year.

Mr. Burgess, director of ARS plant pest control work, advised that eradication of major imported pests always should be attempted whenever there is a fighting chance to do so safely. He cited past successful campaigns against the Mediterranean fruit fly, parlatoria date scale, citrus blackfly, and Hall scale of stone fruits as examples of success in pest eradication.

Quarantine Activities Cited:

The brakes which agricultural quarantines apply to world movement of plant pests contribute continuing benefits to human welfare, observed Horace S. Dean, assistant director of plant quarantine activities of USDA's Agricultural Research Service.

Mr. Dean said the prime function of U. S. Plant quarantines—to keep foreign pests from adding to this country's annual loss of $7 billion or more from pests and diseases of animals and plants—is carried on by more than 450 inspectors at U. S. ports of entry. In 1960 they intercepted a potentially destructive pest every 17 minutes

(*Continued on Page* 85)

Guiding Herbicide Sales In A Dynamic Market

Every marketing manager must undertake a searching analysis of his product's sales record to effectively guide its future fortunes. In no other way can he reach intelligent decisions regarding the sales and promotion efforts for which he is responsible. Practically all major decisions regarding distribution of a product hinge directly or indirectly on this type of information.

By Paul E. Bernard
Doane Agricultural Service, Inc.

MANUFACTURERS continually are confronted with questions concerning the status of their products in the market-place. If a particular brand declined in sales, it is important to be able to answer such questions as: Was there an overall decline in the market which affected competitive products in a like manner? If so, did our product compete better or worse than other brands? Why did our brand lose favor?

If the brand increased in sales — was our increase a part of an overall market expansion? How did our brand fare competitively? Did we gain or lose in share-of-market?

There are many, many other questions, of course. But this illustrates the type of searching analysis every marketing manager must undertake to effectively guide the fortunes of his products. In no other way can the marketer reach intelligent decisions regarding the sales and promotion efforts for which he is responsible. Practically all major decisions regarding distribution of a product hinge directly or indirectly on this type of information.

In the case of herbicides, the marketer has been particularly handicapped because the market is extremely dynamic. In 1960, for example, dollar sales of herbicides increased about 7 percent. Within this framework, sales of types of weed killers varied to an even greater extent. Preemerge chemicals, for example, increased more than 30 per cent, while chemicals for weed and brush control in pasture and non-crop areas *declined over 40 per cent*. Obviously, changes such as these have profound implications for anyone dealing in the market. Until recently, there was no effective way of recognizing and taking action on shifting purchasing patterns.

Let us briefly consider a few herbicide brands to examine their progress and some of the problems the marketing manager may have to solve.

Share-of-Market

	1958	1959	1960
Brand A	2.1%	2.2%	4.2%
Brand B	3.4	3.6	4.0
Brand C	4.3	3.7	5.2

In the case of Brand A, we find a particularly unusual marketing problem. The 1959 share-of-market was about the same as the preceding year, however, sales volume increased because of rapid market expansion. Realizing this situation, management allotted an appreciably larger advertising and sales budget for 1960.

Share-of-market almost doubled in an even greater market than the previous year. This increase was brought about without a corresponding increase in the percentage of customers using the product. The users of the product therefore used greater amounts than the users in the previous two years. This may be due in part to the natural adoption rate of any farm product. An analysis of the users of Brand A may reveal they are generally the same farmers who used the product the previous year. In this case, management must scrutinize the advertising objectives very closely because it would seem that advertising is not doing its job. Promotional effort designed to capitalize on the adoption process of farm products may bring much greater return than current methods employed. This, of course, will require different marketing techniques than those which have led to success up to this point.

Brand B is an old, well-established name in the herbicide industry. Intensive marketing of the product continues to increase its sales at a rate a little greater than the rate at which the total market is expanding. The question in this case is how to continue the present trend or even increase share-of-market in the years to come. In other words, what type(s) of distributional effort should be employed to gain maximum return? Other market data reveal that although Brand B captured 3.4%, 3.6% and 4.0% of the market in 1958, 1959 and 1960, the acreage applied with this product was 5.0%, 7.2% and 6.1% respectively. In other words, a greater percentage of the total acres were treated with Brand B than the ratio of sales to total sales. This, in itself, pinpoints a problem area and it appears that emphasis should be placed on promoting more intensive use among existing users.

(*Continued on Page* 89)

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PRODUCT	HOW USED	COST COMPARISON	OTHER ADVANTAGES
Fertilizer Grade 50 Brown Copper Oxide Fertilizer Grade 75 Brown Copper Oxide	Mixed Fertilizers 1. Complete fertilizers. 2. Granulated. 3. Granular blends. To correct copper deficiencies.	Significant savings on copper costs when compared to copper sulfate. Material handling reduced 50% or more.	1. Prolonged availability. 2. Less toxic. 3. Improves crop quality. 4. Gives maximum yields.
T-B-C-S 53 Basic Copper Sulfate Fungicide 75 Brown Copper Oxide	Neutral coppers for Sprays or in dust formulations. Controls fungus diseases and supplies nutritional requirements.	T-B-C-S 53: Competitively priced. Fungicide 75: More economical.	1. Proven dependable fungicides. 2. Safe when used as recommended. 3. Compatible with wide variety of spray and dust materials.
Feed Grade 75 Brown Copper Oxide	Source of copper in 1. Trace Mineral Salts 2. Trace Mineral Pre-mixes 3. Mineral feeds.	Significant savings compared to copper sulfate or carbonate; competitive with other oxides.	1. Contains no free metallic copper. 2. High copper content. 3. Moisture free. 4. Water insoluble.

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Proper Pesticide Use Stressed At Colorado Meeting

With the development and use of a very large number of the newer pesticides, and the significance of tolerances and residues, experiment stations now have to make recommendations more cautiously than ever before. The sensational publicity around such incidents as the cranberry scare has made people become very conscious of what is going on in the insect and plant-disease control fields.

The older pesticide compounds (those introduced before DDT) still are the chief cause of fatal poisoning by pesticides and children still are the chief victims. The occupational exposure to pesticides undoubtedly is the most significant from the hazard viewpoint. There have been no known cases of illness from insecticide residues on food when formulations have been used according to directions.

FOR the production of agricultural crops and livestock, we have to use pesticides and other agricultural chemicals, Leslie B. Daniels, chief entomologist, Colorado Experiment Station, told the 10th annual meeting of the Colorado Agricultural Chemicals Association, January 26 and 27, at the Cosmopolitan Hotel in Denver, Colorado. Dr. Daniels added that "all of us recognize the responsibilities involved in the use of pesticides. The hazards have been recognized since the beginning of insect and plant disease controls."

With the development and use of a very large number of the newer pesticides, he said, and the significance of tolerances and residues, and the public health hazards involved, we now have to make recommendations more cautiously than ever before. Dr. Daniels pointed out that the sensational publicity around such incidents as the cranberry scare has made people become very conscious of what is going on in the insect and plant-disease control fields.

Dealer's Problems

Carrol W. Wade, Paonia Marketing Association, Paonia, Colorado, discussed the problems of agricultural chemical dealers and fruit producers in Colorado. He said that grower and dealer problems regarding what chemical to use and the rate of application are very complex. Mr. Wade asked the chemical manufacturers if there was not some way in which directions on a package of insecticides can be more simply worded. He said that this would be helpful to the grower. Many times, he pointed out, growers "simply do not know what you are talking about when you state that you have a 20 per cent material and need so much of actual material to the acre." Mr. Wade recommended that conversion tables be supplied along with spray schedules.

Referring to the possibility of a Spray Applicators Law being passed by the current session of the Colorado legislature, Mr. Wade said that a bill of this nature may have some merit but it should be considered very carefully or it may prove to be unworkable in certain areas because of the type of crop being grown or equipment being used. Mr. Wade quoted one custom sprayer, who also is a grower, as saying that he would have to discontinue helping his neighbors get their spraying done with his rig if he were compelled to post a bond.

"I know the intent of such a bill is proper," Mr. Wade said, "but it might prove to be more expensive to the farmer in the final outcome."

In closing, Mr. Wade listed a few of the responsibilities of the dealers who handle agricultural chemicals for the consumer. First, he said, the dealer must obtain and keep a general line of spray materials, he must be able to recommend the proper material for each insect problem, and he should know at all times the safety precautions to be taken for each pesticide he handles.

Public Health Aspects

The public health aspects of chemical pesticides were discussed at the meeting by Dr. R. L. Cleere, executive director of the Colorado State Department of Public Health. He said that the public health aspects of chemical pesticides are three-fold. First, the direct aspect through the control of vector-borne diseases, and, indirectly, through increased and improved agricultur-

al production which improves the well-being of the population through increased consumption of a balanced diet. On the other side of the coin, he said, lies a problem which is implied in the use of any biologically active chemical that is a potential hazard to health and must be evaluated under all possible conditions.

Dr. Cleere said that the older pesticide compounds (those introduced before DDT) still are the chief cause of fatal poisoning by pesticides, and children still are the chief victims. The occupational exposure to pesticides undoubtedly is the most significant from the hazard viewpoint, he said. The individual employed in the manufactur, packaging, formulation, distribution, and application of pesticides has been shown to have a direct exposure far in excess of any incidental or indirect exposure. With the new organic pesticides, he added, the dermal route of exposure, which was not considered at the time of the introduction of the organic pesticides, is the critical factor. The problem is aggravated, he said, by the personal habits of some migratory farm workers who do not apply the fundamentals of personal hygiene to any appreciable degree. Also, he continued, their remuneration is determined by piece work production which produces its greatest returns by longer periods of continued work. This obviously keeps the laborer who harvests crops treated with pesticides in contact with the residue remaining on the crops for long stretches of time.

The hazard resulting from the ingestion of food and water containing chemical residues has been given considerable publicity since the Delaney hearings which commenced in 1951, he said. To date, Dr. Cleere added, there have been no known cases of illness in this country from insecticide residues on food when formulations have been used according to directions.

Basically, he said, the labeling requirements of our laws, when ap-

(Continued on page 88)

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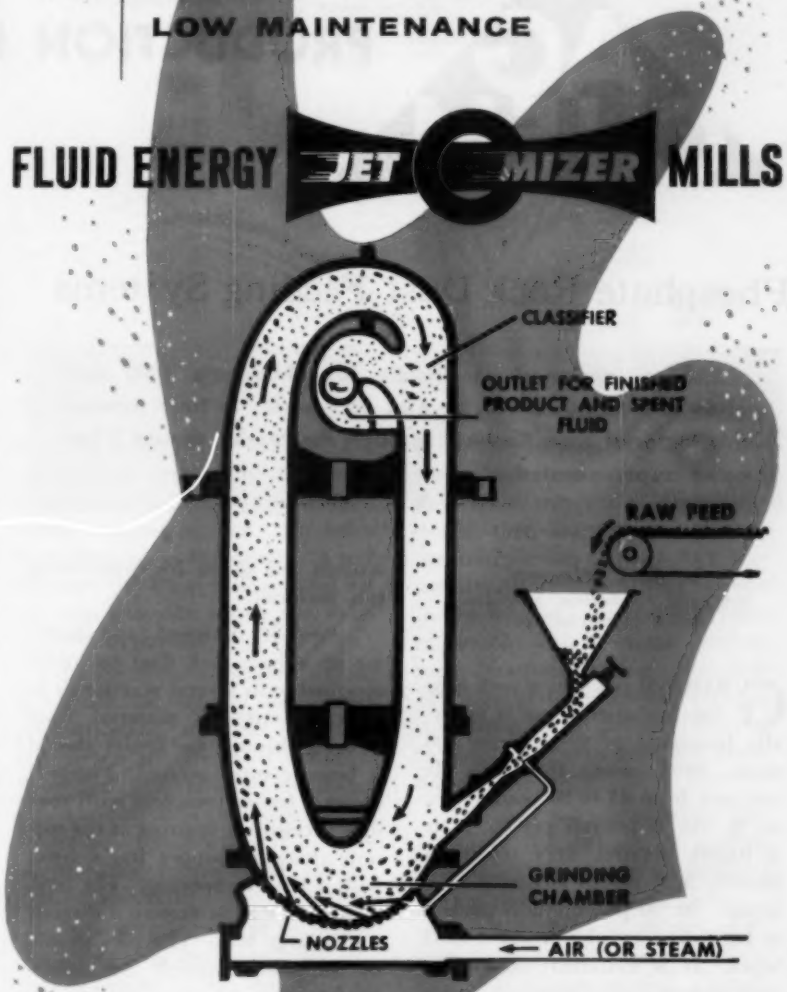

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AG CHEM

PRODUCTION ROUND TABLE

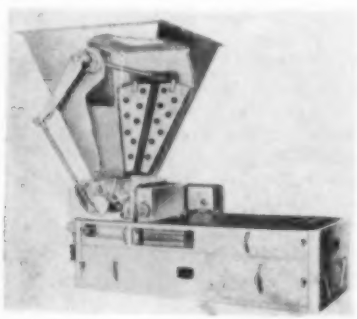
Phosphate Rock Dust Feeding Systems

Feeders designed specifically for phosphate rock dust often are supplied with several accessories to help prevent this material from flushing through the feeder should it become super-aerated.

by D. L. Warren
Industrial Application Specialist,
B-I-F Industries, Inc.

GROUND phosphate rock dust for acidulation use is generally furnished at 80% minus 200 mesh, 100% minus 100 mesh. It can vary from 45 to 90 pounds per cu. ft. At 45 pounds per cu. ft. it is highly aerated, very tricky to handle, and reacts virtually as a liquid. At 90 pounds it is packed so hard that it is almost like a solid block. It is extremely important that upstream conditions are set up so the rock will be delivered to the rock feeder at approximately 60 to 70 pounds per cu. ft. in which condition it flows well. Later, three systems are given for controlling this material.

Fig. 1. Omega Model 37-20 Hi-Weight Belt Gravimetric Feeder (with hopper agitators and "Rotolock")



Feeders designed specifically for phosphate rock dust often are supplied with several accessories to help prevent this material from flushing through the feeder should it become super-aerated. Figure 1 shows a feeder complete with rock dust accessories. Starting at the top, note that the hopper has a cover with a 1 sq. ft. opening. The feeder should not be mounted directly under large bins. The rock should be supplied through the feeder hopper opening from another bin above, a bucket elevator, an inclined screw or some other conveying device.

The hopper in Figure 1 has about 12 cu. ft. capacity, and, when some type of conveyor or elevator is used to load this hopper, it is recommended that bin switches be applied to stop-start the feed. In this case, it's necessary to use an extension of up to 2' on the feeder, which would contain the switches plus a little extra material. No more than a 2' extra head of rock dust is recommended on the Rotolock Feeder.

Inside the hopper are plate agitators operated from the rotor drive which, in turn, is driven by a variable speed transmission which drives the feeder. This makes the non-flood protection and agitators operate at a speed proportional to the rate of feed through the feeder.

Flushing or flooding of rock dust through the gate onto the belt is prevented by feeding the belt with the Rotolock Feeder shown in the cut-away (Fig. 1). This is a rubber-bladed vane feeder operating at a speed proportional to belt speed (rate of feed) which seals the opening. The weigh belt and control gate, of course, do the final trimming but the actual feeding to the belt is done by the rotor, and there always is some material recirculating in this rotor. This is so that as the density of the material changes there will be a reserve supply in the rotor to give the gate the amount it needs to maintain accurate feed by weight.

The first method of conditioning the rock to a workable bulk density and one which we approve is shown in Fig. 2. This shows a "working hopper" which receives rock dust from the main supply or the rock mill. This is trough-shaped and inclined at the bottom so that it sits directly on top of a screw conveyor which may have varied pitch flights for even unloading across the bottom. This amounts to a live bottom hopper. The screw conveyor is started and stopped in response to the level in the bin which is indicated by the paddle switch.

Another system for loading the hopper (shown in Fig. 3) entails the use of a bucket elevator

and a paddle switch. The elevator is stopped and started in response to the level in the hopper. Another version of this is to have the bucket elevator running continuously with an overflow provided from the hopper which goes back to the boot of the elevator and in this way the level is maintained at the point of overflow. No bin switch is necessary but the disadvantages are that the overflow can be dusty and the elevator runs all the time.

A third system is to mount the feeder hopper directly below the big hopper but with a restriction. Some sort of bin gate should be used between the two hoppers to isolate the main hopper if it becomes necessary to empty out the feeder.

A problem frequently encountered with rock dust is getting the material to flow from large hoppers, and many times people try to overcome the arching or bridging by using aeration or vibration. These are not generally recommended, because aeration creates the very condition we are trying to prevent, and promotes flushing as well as erratic feed; on the other hand, vibration can pack the material tightly to the point where it will arch, bridge, and rat hole.

A very simple and practical method of moving material from large bins is outlined in Fig. 4. This is a method of attaching new or used rubber belting to holes in

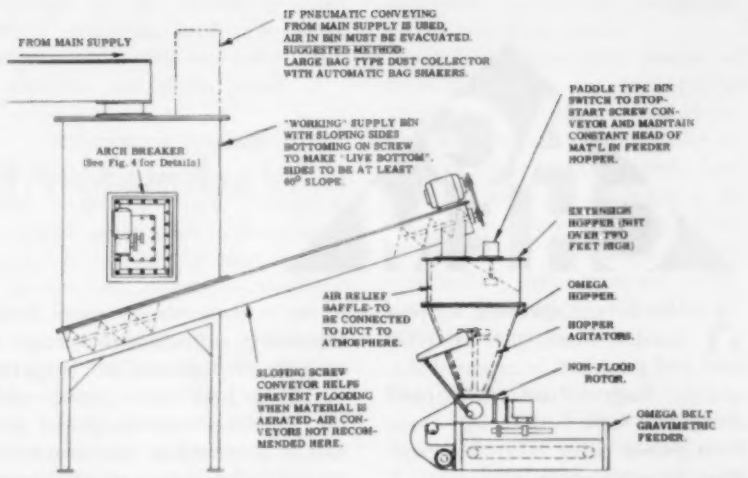

FROM MAIN SUPPLY
IF PNEUMATIC CONVEYING FROM MAIN SUPPLY IS USED, AIR IN BIN MUST BE EVACUATED. SUGGESTED METHOD: LARGE BAG TYPE DUST COLLECTOR WITH AUTOMATIC BAG SHAKERS.
"WORKING" SUPPLY BIN WITH SLOPING SIDES BOTTOMING ON SCREW TO MAKE "LIVE BOTTOM". SIDES TO BE AT LEAST 60° SLOPE.
ARCH BREAKER (See Fig. 4 for Details)
PADDLE TYPE BIN SWITCH TO STOP-START SCREW CONVEYOR AND MAINTAIN CONSTANT HEAD OF MAT'L IN FEEDER HOPPER.
EXTENSION HOPPER (NOT OVER TWO FEET HIGH)
OMEGA HOPPER.
AIR RELIEF BAFFLE-TO BE CONNECTED TO DUCT TO ATMOSPHERE.
HOPPER AGITATORS.
NON-FLOOD ROTOR.
SLOPING SCREW CONVEYOR HELPS PREVENT FLOODING WHEN MATERIAL IS AERATED-AIR CONVEYORS NOT RECOMMENDED HERE.
OMEGA BELT GRAVIMETRIC FEEDER.

Fig. 2. Suggested method of "offset loading" Omega feeder when feeding materials which tend to arch and flood.

the sides of the hopper, and by pulsating them through linkage from a gear motor, preventing bridges, arches, channels, and rat holes from forming in the supply. A rod through the hopper to a panel on the opposite side allows the walls to pulse in parallel.

In the event vibration is used, it should be set up to vibrate proportionally to flow rate and only when the feeder is running. A suggested technique for doing this is to furnish a contactor on the feeder belt which will give a series of impulses proportional to the flow of material.

It is very important in laying out a rock dust system that the upstream conditions do not tend to pressurize the feeder hopper. By using the vent and doing everything else possible to de-aerate the rock dust upstream, Omega tries to prevent this and if there's any doubt, then another vent straight up from the top of the feeder hopper should be used. Pressurization in the hopper causes several types of trouble such as erratic feeding, super-aeration, forcing dust into bearings, and, in general, creating conditions which prevent accurate feeding, and cause increased maintenance.

A word on bin switches. Our engineers recommend paddle switches. These should be arranged so that the paddle has 12 to 14" or more space above it which can fill with rock dust. Sometimes if the rock dust is over-aerated, a condition occurs where the paddle keeps turning, even though it is covered, because the rock dust is so aerated it would not develop the resistance necessary to stall the paddle and operate the switch.

It should be remembered that rock dust varies in its physical state somewhere between the liquid and the solid, depending on the degree of aeration. The trick is to adjust the aeration to a point where it is not aerated to a liquid nor de-aerated to a solid. If the rock dust is conveyed from main storage or pulverizer by a pneumatic conveyor, then the problem is to

(Continued on Page 90)

Fig. 3. Suggested method of installing feeder for handling floodable materials. Fairly constant head of material is maintained by bucket elevator which starts-stops in response to signal from paddle switch. An extension hopper approximately 2 feet above top of the Omega hopper gives detention time to allow material to de-aerate to proper density for feeding.

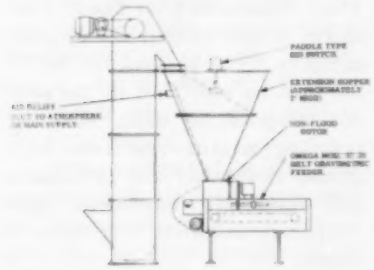
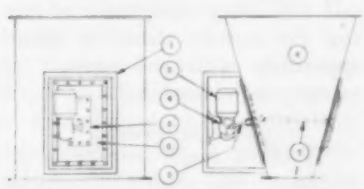


Fig. 4.
1—heavy steel frame
2—gear reduction motor (20-25 rpm)
3—linkage
4—disc with eccentric drilling to adjust stroke length
5—steel plate approx. 50% of flexible area
6—heavy conveyor belting bolted to cutout in bin walls
7—linkage to opposite side (when necessary)
8—bin



AG CHEM

Washington Report

by Donald Lerch

A RISE in farm spending for production items such as fertilizers and pesticides is expected this spring. Such is the result farm spokesmen here believe will come from moves being taken by President Kennedy's administration.

When Orville Freeman became Secretary of Agriculture, he was given the job of bolstering the farm economy. His sights are on raising net farm income 10% or about $1 billion in 1961. Already announced are plans to make advance payments to farmers who store grains on their farms under the price support system.

Also in the works are plans to release $35,000,000 in new money in a contingency fund for farm operating loans made by the Farmers Home Administration to farmers who cannot get credit elsewhere. The outlook is for even more such loan money next year, if Congress goes along with Secretary Freeman's proposals.

The Administration is promoting these moves to stimulate business as well as the farm economy. It adds up to good news for pesticide and fertilizer manufacturers who have been looking forward to better sales this year than last.

Threat to Wildlife

Wildlife enthusiasts have finally come face to face with their major problem — people. It's the pressures of rapidly expanding population that pose the major threat to wildlife.

Such was the view of many conservationists attending the 26th North American Wildlife and Natural Resources Conference here in Washington early this month. Population pressures are turning up in terms of demands for more food, expanding suburbs and spreading network of highways and airports.

From here on in, many wildlife leaders feel their major job will be planning to maintain wildlife and the values of wilderness areas in a world where more and more people will be competing for the space wildlife need for survival.

Some are eyeing field, farm, forest, and range areas as open areas which might be "planned" so as to afford wildlife a better environment.

Another Natural Problem

Wildlife enthusiasts are facing another "natural" problem which may turn them more toward the use of chemicals to improve wildlife habitats. An aquarium plant, known as Eurasian Water Milfoil, is invading large areas of tidewater Maryland.

Reports coming in indicate that the Water Milfoil, a long, feathery plant used in fish aquaria, also exists in varying degrees in New York, New Jersey, Virginia, North Carolina, and Tennessee, and may be getting started in California.

Its threat to wildlife comes from the fact that it chokes off plant life on which fish and ducks feed. And it also clogs streams, making navigation difficult and bathing almost impossible.

The Governor of Maryland has included money in his budget for the next fiscal year for chemicals and other equipment to control the rapidly spreading plant, apparently with the support of wildlife enthusiastics.

New NAC Problem

While a major activity at the National Agricultural Chemicals Association right now is providing legislators, particularly state legislators, with information, the Association is launching a new program for reaching the average consumer.

Recognizing the importance of women in respect to food issues, NAC soon will release a series of one-minute radio spots designed to tell women listeners the vital role of pesticides in assuring them an abundance of high quality, safe foods.

Issues to be covered will include the dangers to food abundance and quality posed by pests, the safety testing of chemicals, industry-government cooperation in promoting the Read-the-Label program, and farmers' excellent record in applying pesticides with due regard to the safety of consumers.

In this regard, the entire Industry has been cheered by the statement by Dr. Hazel K. Stiebeling, Director of USDA's Home Economics Institute, and one of the nation's top nutritionists, congratulating entomologists for the fine job they are doing in controlling pests and, thus assuring consumers of a nutritious food supply.

Also making a great impact, particularly in Washington, is the article by Dr. Frederick J. Stare, Chairman, Department of Nutrition, Harvard University, on "Are There Poisons In Your Food?" One of Dr. Stare's most quotable comments is, "The poisons are not in the food or water but in the pens and tongues of those who, by peddling misinformation, half-truths, statements out of context and downright falsehoods, gain temporary notoriety and make a profit."

Needless to say, top level administrators in Washington today are paying more attention than usual to statements coming from outstanding professors at Harvard University.

Home Market Sales

Whenever the subject of industry sales to the home market comes up among industry leaders here, the talk usually centers around the intriguing question: How big is the home market?

While no reliable total dollar figures for this market are available, one segment of those serving this market — hardware dealers — reports sales of seeds, fertilizers, and pesticides in the neighborhood of $100,000,000 a year.

Interestingly, some 75% of hardware dealers now carry herbicides, over 91% carry insecticides, and about 96% handle sprayers and dusters. Nearly all dealers report that sales are going up, mostly to home owners and renters.

Seed, fertilizer, and pesticide sales by hardware dealers, incidentally, amount to about 20% of all their farm and garden sales, the other 80% being made up of sales of hand and power mowers, lawn and garden tools, garden hose and accessories, farm and dairy supplies, and fencing.

Considering that fertilizers and pesticides are sold by chain stores, super markets, catalog houses, discount houses, department stores, lawn and garden shops, lumber yards, and variety stores as well as hardware stores, the grand total of sales in the home market looms as a significant market for the industry.

Industry leaders here regard this trend as reflecting a groundswell of popular support for fertilizers and pesticides since relatively low budgets are put into promoting to this market as compared with funds spent in promoting to the farm market.

Some leaders feel, as well, that growing personal experience with the effectiveness and safe use of pesticides by home owners is invaluable to the industry's good public relations, and that more promotion to this market is warranted for this reason alone.

Tolerances Overseas

Residue tolerances for U. S. food crops now are getting a thorough going over in West Germany and will likely affect several U. S. export crops, particularly citrus.

Just back from a trip to West Germany, USDA's Dr. H. L. Haller tells us that the West Germans have accepted the principle of tolerances for pesticide residues, but tend to be even stricter than U. S. standards.

An ultimate goal of European countries is to set up uniform tolerances in the Common Market area plus Great Britain, but this may be a long time in coming. In the meantime, developments abroad will continue to be of considerable interest to U. S. growers and to pesticide manufacturers. Of particular interest will be European attitudes on labeling of foods treated with pesticides.

U. S. Exhibit

Congratulations are due to a number of major fertilizer and pesticide firms for their participation in the U. S. exhibit at the International Agricultural Exhibition in Cairo, Egypt, March 21-April 21.

J. K. McClarren, of USDA's Office of Information, who is Director of Content for the Exhibit, expects over 1,000,000 farmers and others from the Middle East to view the exhibit.

One feature will be agricultural chemicals, part of a display showing how government and industry cooperate in speeding American agricultural progress through research. This part of the exhibit will be supervised by USDA's Dr. Harold Shepard.

Another feature, in which one major fertilizer firm is taking part, is a display of how new agricultural information is made available to farmers via county agents, Extension specialists, magazines, radio, and other media.

NAC, incidentally, played an important role in encouraging participation of agricultural chemicals firms in the exhibit designed to show the vital Arab world how superior American farming is to that of the Communist bloc. Other exhibits at the International event will include ones from the Soviet Union, Communist China, and other bloc countries.★★

•

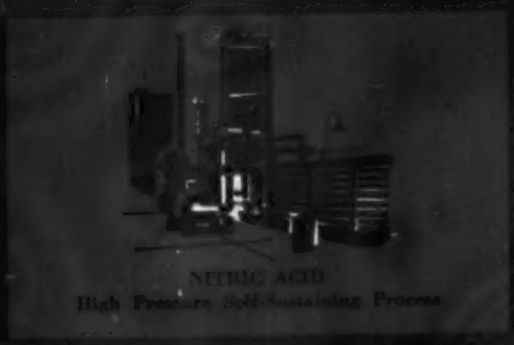
Phosphate Use Rising

The United States now is producing about 16 million long tons of phosphate rock per year, of which approximately 60 per cent is used in fertilizer, Dr. L. B. Nelson, manager of the office of agricultural and chemical development of the Tennessee Valley Authority, said last month in an address before the Soil Science Society of North Carolina in Raleigh.

"Phosphate consumption undoubtedly will continue to increase in response to the needs for more efficient farming," he said. "The trend toward higher analysis of mixed fertilizers will continue, which means that normal superphosphates will be superseded by concentrated superphosphates, ammonium phosphates, phosphoric acid, and other high analysis phosphate compounds." He added that there is every indication that greater use will be made of liquid mixed fertilizers. •

Western Cotton Conference

The Western Cotton Production Conference will be held in Phoenix, Arizona, March 7 to 8, at the Ramada Inn. Among the speakers will be Dr. H. W. Reynolds, ARS-USDA, Cotton Research Center, Tempe, Arizona, who will discuss the control of nematodes; H. Fred Arle, also of the Cotton Research Center at Tempe, who will tell of weed control research developments; and Norman B. Akesson, agricultural engineer, University of California, Davis, who will advise of methods for the application of agricultural chemicals to avoid drift damage.



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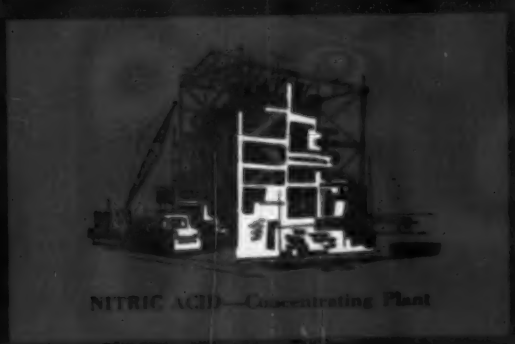

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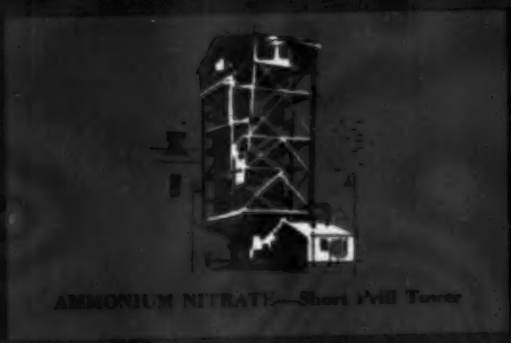

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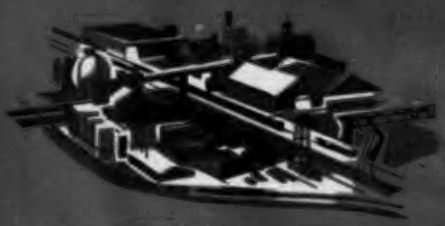

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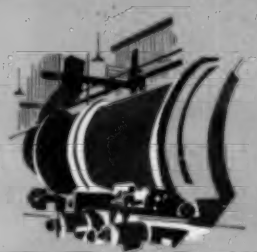

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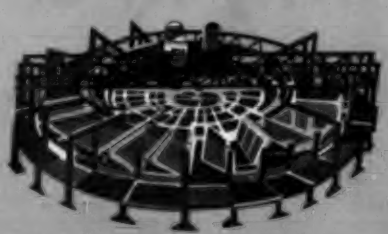

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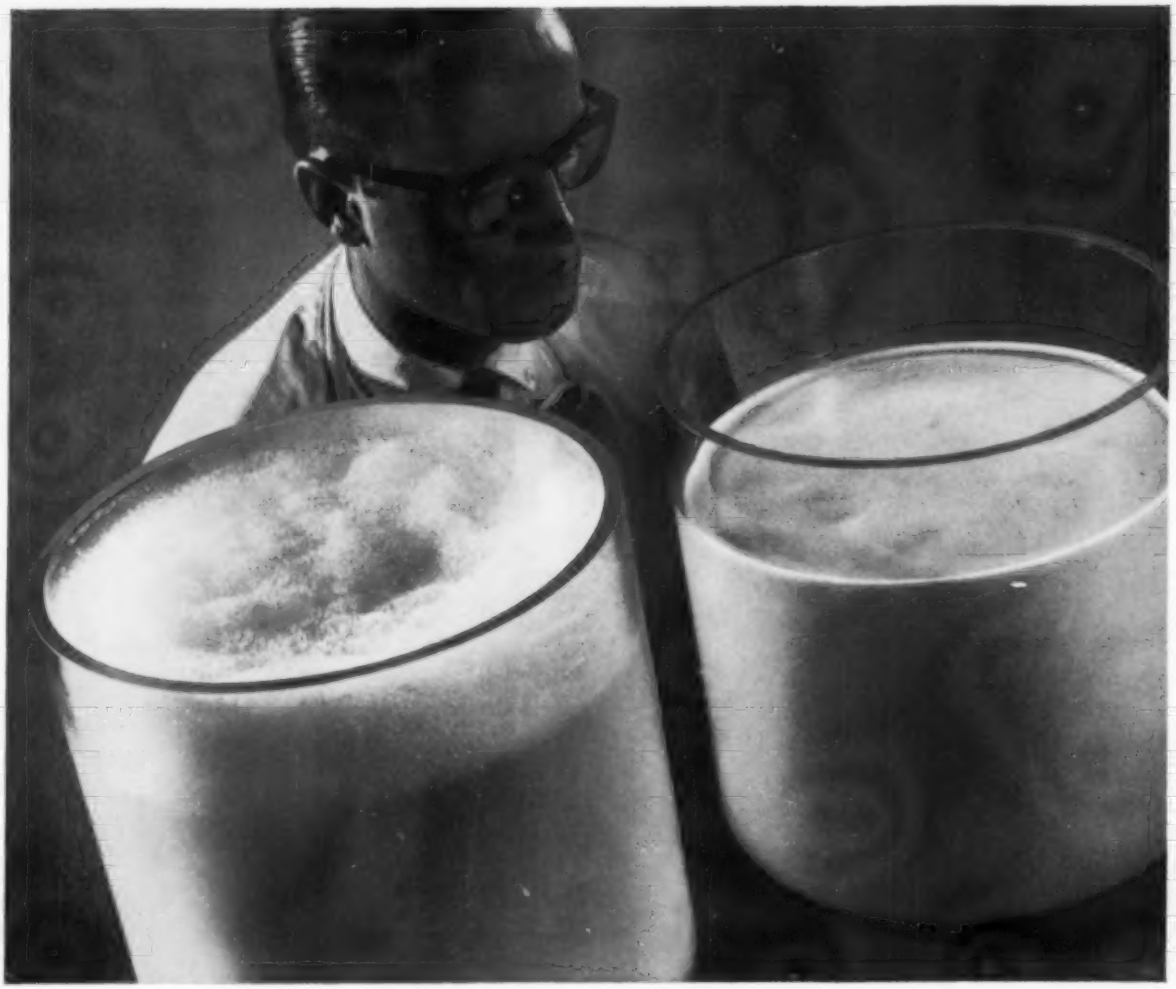

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Responsibilities, New Developments Stressed At Illinois Custom Spray School

It is the responsibility of everyone concerned with the use or application of pesticides to see that they are used properly. The use of agricultural chemicals is necessary to the production of the quality of foods demanded by the American public.

Other topics include new herbicides for corn, winter applications of soil insecticides, and a potential new pest of corn in Illinois, the corn leaf aphid.

MUCH of the public concern about the use of pesticides results from their improper use, and it is the responsibility of everyone concerned with the use or application of pesticides to see that they are used properly, M. P. Jones, Federal extension entomologist, Extension Service in Agriculture and Home Economics, Washington, D. C., told the 13th Illinois Custom Spray Operators' Training School, January 25 and 26, at Urbana. He said that "Everyone of us also has a responsibility to use every opportunity to inform customers that they are the best fed, and best clothed of any people and this could not be so without the use of properly applied chemicals to control plant pests."

Mr. Jones said that the American public has dictated the quality of food it wants and the use of agricultural chemicals is necessary in the production of such foods. To stay in business, he pointed out, farmers who grow high quality food must produce it efficiently. Recommendations for pest control must be carefully prepared, he said, and the extension worker, the pesticide dealer, salesmen, and fieldmen, as well as the applicator, should promote the same set of recommendations. It is confusing, and sometimes hazardous, Mr. Jones said, to have each group that contacts the grower present different recommendations. Everyone concerned can lose when such a practice is followed, he declared. The farmer may not receive the greatest returns from his investment in insect control and he could lose faith in the practice. When this happens, Mr. Jones concluded, the pesticide industry loses a customer and the commodity buyer receives an inferior product.

Weed Control In Corn

There are a number of good herbicides for controlling weeds in corn, and new ones are likely to be found that will be even more effective, F. W. Slife, associate professor of crop production, U. of Illinois, told the group. He said that pre-emergence sprays have become popular within the past three or four years. In total acreage treated, he added, they do not compare with 2,4-D post-emergence, although the pre-emergence

Left to right: August O. Voges, farmer and county weed commissioner from Evansville, Ill.; J. B. Bigger, research entomologist, Illinois Natural History Survey; and M. P. Jones, Federal extension entomologist, Washington, D. C.

Left to right: Steve Moore, University of Illinois; Fred Slife, U. of Illinois; R. O. Hall, spray operator and chemical dealer from St. Charles, Ill.; and Frank Kadleck (seated right), Kadleck's Pest Control, Red Bud, Illinois.

Left to right: (seated) Ray Everly, Purdue University entomologist, and Bob Seifert, custom sprayer from Harvey, Ill. (standing) Vern Anderson, custom sprayer from Newark; Dana Stewart, custom sprayer from Princeville; and Earl Davies, custom sprayer from Morris, Ill.

Left to right: Wendell Bowers, U. of I. agricultural engineer; Glen Landers, dealer in ag chemicals from Sullivan, Ill., H. B. Petty, extension entomologist with University of Illinois and Illinois Natural History Survey; and Asher Roberts, custom sprayer from Gilman, Ill.

treated acreage is increasing rapidly.

Grass weeds in corn are increasing rapidly, he said, and it would appear that our major problem in the next ten to twenty years will be primarily grass rather than broadleaf weeds. The three most widely used pre-emergence treatments for corn are 2,4-D, Atrazine, and Randox, Mr. Slife pointed out. He added that each compound has different characteristics and, before making a choice, the applicator should be familiar with these characteristics so that he can pick the one which most nearly fits his needs.

Unfortunately, he said, germinating corn does not have a high degree of tolerance to 2,4-D (the most widely used pre-emergence treatment for the past few years), and the chemical may injure the corn if enough rain occurs to move the material down to the germinating level. In addition, he added, 2,4-D does not control grass so well as it does the broadleaf weeds. Because Atrazine and Randox control grass weeds better than does 2,4-D, and because corn is highly tolerant to these compounds, Mr. Slife predicted that 2,4-D pre-emergence will be less important in the future in cornfields than it has been in the past. As Randox and Atrazine are used more widely, he continued, more information will become available on the particular areas in which they work best.

The newest area of development in pre-emergence chemicals, Mr. Slife said, is in the field of granules. Pre-emergence chemicals seem to perform about as well in granular as in liquid form, he said, but only if the granulars are applied evenly so that a good pattern is obtained. Although both forms performed well in 1960, he disclosed, the granular forms were not quite as good as the liquid sprays in some instances. This, however, seemed to be caused by poor application rather than to any defect in the granular form. Granular applicators are new, he pointed out, and they have required a considerable amount of adjustment. It will undoubtedly be several years before the bugs are completely gone, he said, but, since the granular forms are convenient, and are rapidly being accepted by the farmer, every effort should be made to provide good granular applicating equipment.

A Potental Pest

The prevention of corn leaf aphid damage was discussed by C. A. Triplehorn, professor of entomology, Ohio Agricultural Experiment Station, who said that the aphid is a potential pest of considerable magnitude, and its activity should be closely observed every year to avoid such disastrous results as were experienced in Ohio in 1957 and 1959. If used properly, he said, both malathion and parathion are quite effective in reducing aphid populations. This means getting the insecticides into the whorl of the plant at, or just prior to, tassel emergence, he pointed out. Spectacular aphid kills have been reported, Mr. Triplehorn continued, with airplane applications of these two materials after tassel emergence, but this was thought to be too late for much benefit in most instances.

Preliminary studies, he said, have been conducted with granular formulations of insecticides which performed well as sprays. Good to excellent results have been obtained, he reported, and most recent work has been based on granulars. Phorate (Thimet) and Di-Syston granules, he said, were outstandingly effective in giving nearly complete control in less than 24 hours when applied as tassels were emerging.

Winter Applications

In tests with soil insecticides during 1960, main emphasis was placed on applications made prior to planting time, J. H. Bigger, entomologist, Illinois Natural History Survey, reported. He said that the insecticides were applied during the fall, winter, and spring, and usually prior to plowing the field. It appears, he reported, that the pre-planting-time treatments fail to control cornfield ants and corn root aphids. Otherwise, they appear to be on a par with planting-time broadcast treatments.

The tests with pre-planting-time treatments, Mr. Bigger continued, have progressed to where qualified approval can be given to applications of this type if they are made between December 1 and March 15 in central or northern Illinois. Applications made later in the spring, he said, should probably be treated like planting-time treatments and disked in promptly.

Molybdenum On Soybeans

A progress report on the use of molybdenum on soybeans was

(*Continued on Page* 87)

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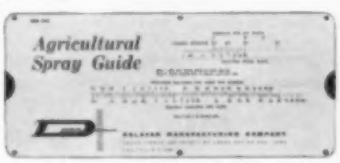

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MISCELLANEOUS PUBLICATIONS OF THE ENTOMOLOGICAL SOCIETY OF AMERICA

This new periodical contains timely and scholarly articles of 20 printed pages or more. The individual numbers appear at irregular intervals. Each volume will contain about 200 pages.

Volume 1, Number 1, pp. 1-32 appeared October 1, 1959, and contains the symposium papers on Insecticide Resistance in Arthropods of Medical and Veterinary Importance given at the Salt Lake City meeting in December 1958. Authors are H. F. Schoof, R. B. March, A. W. A. Brown, and Herbert Knutson. Single copy, $2.50.

Volume 1, Number 3, pp. 69-171 appeared July 27, 1960 and contains the following: "Swarming and Mating in Mosquitoes," by Erik Tetens Nielsen and James S. Haeger. "A Revision of the Genus *Chlaenius* Bonelli (Coleoptera, Carabidae) in N. America," by Ross T. Bell. Single copy, $6.00.

Volume 2, Number 1, pp. 1-175 appeared October 19, 1960 and contains the 23 papers presented at the Symposium—Research Progress on Insect Resistance held at Washington, D. C., October 7 and 8, 1959. Single copy, $7.50.

Terms of Subscription. $10.00 per volume in North America and U. S. Possessions, $10.50 elsewhere.

Write to the

Entomological Society of America

4603 Calvert Rd., College Park, Maryland

Treating Fruit Trees With Mist Blowers

Angling the mist blower so that the outlet points rearward at an angle of 30 to 60 degrees from the line of travel is recommended because it allows more distance for the spray stream to spread before reaching the trees, and it enables the operator to reduce the angle of spread at the outlet.

by S. F. Potts
Crawford, Miss.

A THREE-HOLE mist blower can be used to treat fruit and nut trees up to eighteen feet in height and mist blowers with the single-hole outlet can be used for trees of any size up to sixty feet in height.

Because of the variation in tree heights, density, and width of rows, it often is advisable to angle the machine on the tractor (or carriage vehicle) so that the three-hole outlet points rearward to an angle of thirty to sixty degrees from the line of travel. This is recommended rather than the usual method of delivering spray at right angles to the line of travel. It allows more distance for the spray stream to spread before reaching the trees, and it enables the operator to reduce the angle of spread at the outlet, thereby avoiding skips between separate streams of the three outlets.

To reduce or increase the angle of spread, one or both of the following procedures may be followed. The three-hole outlet may be turned on a collar to obtain the right amount of spread, or the two outside outlets may be moved in or out until the proper angle of spread is obtained for best coverage.

The single-hole outlet on a mist blower seldom is used in a fixed position for fruit trees. Therefore, application requires an operator in addition to the driver *unless* an auxiliary attachment for rotating the blower housing from the driver's seat is provided with the machine. The three-hole outlet mist blower requires only the driver. The single-hole outlet, however, is used for practically all pecan trees because of the height of the trees to be sprayed.

Special care should be taken to cover well the top one-third of pecan tree crowns with two-thirds to three-fourths of the spray for the tree. The remaining one-third to one-fourth of the spray volume should lightly cover the lower two-thirds of the crown.

Coverage rate for pecans is one to acres per hour depending on size and height of trees. Nor-

(*Continued on Page* 87)

Rate of coverage of fruit trees with machine traveling at given speeds, treating both sides of each row:*

Travel of machine m.p.h.	Distance between rows (feet)	Acres per hour	Gallons per hour at** 2.5 gal. per acre	5 gal. per acre	10 gal. per acre	15 gal. per acre	30 gal. per acre	45 gal. per acre	60 gal. per acre
1	20	1.2	3.0	6.1	12.1	18.2	36.4	54.6	72.8
	30	1.8	4.5	9.1	18.2	27.3	54.5	81.8	109.0
	40	2.4	6.1	12.1	24.2	36.4	72.7	109.1	145.4
	50	3.0	7.6	15.2	30.3	45.5	90.9	136.4	181.8
1.5	20	1.8	4.5	9.1	18.2	27.3	54.5	81.8	109.0
	30	2.7	6.8	13.6	27.3	40.9	81.8	122.7	163.6
	40	3.6	9.1	18.2	36.4	54.5	109.1	163.6	218.2
	50	4.5	11.4	22.7	45.5	68.2	136.4	204.6	272.8
2	20	2.4	6.1	12.1	24.2	36.4	72.7	109.1	145.4
	30	3.6	9.1	18.2	36.4	54.5	109.1	163.6	218.2
	40	4.8	12.1	24.2	48.5	72.7	145.4	218.1	290.8
	50	6.1	15.2	30.3	60.6	90.9	181.8	272.7	363.6
3	20	3.6	9.1	18.2	36.4	54.5	109.1	163.6	218.2
	30	5.5	13.6	27.3	54.5	81.8	163.6	245.4	327.2
	40	7.3	18.2	36.4	72.7	109.1	218.2	327.3	436.4
	50	9.1	22.7	45.5	90.9	136.4	272.7	409.1	545.4

*When treating each row from two sides (as above), the width of swath is half the distance between rows of trees. If rows are treated from one side only, the rate of coverage and rate of output has to be twice that given in the table above.
**Divide these figures by sixty to find gallons per minute.

Gallons delivered per nozzle per hour with several whirljet nozzle sizes:

Nozzle number	Diameter of orifice (inch)	Gallons delivered per hour at the following pressures: (pounds) 10	15	20	30	40	60	80	100
1	1/16	6.0	7.35	8.4	10	12	14.4	16.8	18.6
2	5/64	12.0	14.7	16.8	20	24	28.8	33.6	37.8
3	3/32	18.0	22.0	25.0	30	36	43.2	50.4	56.4
5	1/8	30.0	36.7	42.0	51	60	72.0	84.0	96.0
10	5/32	60.0	73.0	84.0	100	120	144.0	168.0	192.0

10th Texas Ag. Conference

The tenth annual Texas Agricultural Aviation Conference was held February 26 to 28 at Texas A & M College, College Station, and was featured by discussions about the development and future of agricultural aviation, and the present status of agricultural chemicals.

Among the speakers on the program were Fred E. Weick, Piper Aircraft Corp., Vero Beach, Fla.; Dr. H. L. Haller, Agricultural Research Service, USDA, Washington, D.C.; Jack Dreessen, NACA, Washington, D. C.; Norman B. Akesson, California Agricultural Experiment Station, Davis; and George S. Sanders, Agricultural Aviation Engineering Co., Santa Clara, Calif. Topics covered by the speakers included; work rate capabilities of agricultural aircraft, equipment and application techniques in relation to pesticide drift and residues, basic design factors for aircraft distributors, factors governing the distribution of granular materials, and invert emulsions.

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To Include Ground Sprayers

The Norkem Corp., Yakima, Wash., sponsors of the Four-State Aerial Applicators Conference for the past two years, has announced that the 1961 conference will include sessions on ground application. In addition, the name of the conference will be changed to Applicators and Chemical Conference. It will be held October 9 and 10 at the Chinook Motel and Tower in Yakima.

The first day of the conference, as in the past, will be devoted to the presentation of papers dealing with agricultural chemicals and problems of application, by all methods. The second day, expected to be held at the Yakima Municipal Airport, will provide time for the demonstration of both aerial and ground applicating equipment. The four states are Washington, Oregon, Idaho, and Montana.

25th PCO Conference

The 25th annual Purdue Pest Control Operators Conference was held January 23 to 25 at Purdue University, Lafeyette, Indiana. More than 400 persons attended the conference.

Among the subjects covered at the conference were: fundamentals of insect control; identifying insects and insect damage; insecticides and formulations; and safety. An added feature of the conference was the presentation of a diamond-studded tie clasp to J. J. Davis for his initiation of the conference 25 years ago. Dr. Davis is former head of the Department of Entomology at Purdue.

The Indiana Pest Control Operators Association held its annual meeting in conjunction with the conference. Harry J. Cochnower was reelected as president of the association. L. B. Lacy was named vice president, Louis Berzai was named director, and J. J. Davis was elected secretary-treasurer.

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AG CHEM

PEST ROUNDUP

Conditions of Forest Insects During 1960

This month's column was prepared by Mr. Jack W. Bongberg, Entomologist, Division of Forest Insect Research, U. S. D. A., Washington, D. C.

SUMMARY reports on conditions of forest insects during 1960 received from some of the Forest Service Experiment Stations throughout the country indicate, with minor exceptions, severe damage and destruction to the forest resources, and in many places, large-scale control projects were needed to suppress outbreak populations.

In the Lake States, the large-scale outbreak of spruce budworm expanded in area and increased in intensity. Nearly 100,000 acres of spruce-fir timber are now so severely defoliated that top-killing and tree mortality is prevalent throughout the infestation area. Control was undertaken during June to suppress populations and thus forestall excessive tree-killing until stands can be harvested. Additional control by aerial spraying likely will be undertaken during 1961.

Populations of the jack-pine budworm also increased greatly in several areas of the Lake States and chemical control was applied in some places to minimize tree damage and tree-killing. Mature timber in affected areas is being harvested as rapidly as possible to reduce the hazard.

Defoliation of pines by several species of sawflies occurred extensively in Minnesota, Michigan and Wisconsin. The red-headed pine sawfly was most prevalent but the introduced pine sawfly also caused heavy defoliation in various parts of all three states. General defoliation of larch by the larch sawfly occurred throughout most of the tamarack stands in the Lake States but complete stripping of trees was more spotty than in prior years.

Bark Beetles Important

In the southern states, bark beetles continued to be the most important forest pests, but tree-killing was somewhat less than in recent years. Populations of the southern pine beetle in southeast Texas reached a peak in early summer but declined to a low level by late fall. The black turpentine beetle also was active and destructive to southern pines on low sites in parts of the Gulf States. The shallow root systems of trees on such sites are highly susceptible to injury by soil compaction and bruising by logging machinery, and injured trees are readily attacked and killed by the beetles. Damaging infestations are expected to continue in southern logging areas.

Extensive areas of water tupelo, black gum, sweet gum, and other bottomland hardwoods suffered heavy defoliation by forest tent caterpillar early in the season in portions of Louisiana and Alabama. This outbreak, dating from 1953, now is causing tree mortality in some places, and the killing of branches and tops in many others. Severely defoliated trees now are growing at less than half their normal rate and the lack of reproduction resulting from destruction of flowers on mature trees is also causing concern.

Severe Infestations

Infestations of various forest insects in the Intermountain and northern Rocky Mountain states were numerous and many were quite severe during 1960. The mountain pine beetle occurred in epidemic numbers and killed countless numbers of trees in many places. Stands of old-growth white pine in the Clearwater National Forest in Idaho suffered greatly; lodgepole pine in the high elevation zones in northern Utah, eastern Idaho, and western Wyoming were heavily infested; and, second-growth ponderosa pine on the north shore of Lake Tahoe in Nevada and near Atlanta, Idaho, also suffered heavy tree-killing. Major effort was expended to reduce beetle populations in all infestations and thus minimize the rate of tree-killing in affected areas.

Several serious outbreaks of Engelmann spruce beetle which developed in southern Idaho, Utah, and western Wyoming during the past few years persisted in 1960. The most serious outbreak, first discovered on the Uinta, Ashley and Wasatch National Forests, Utah, in 1958, covered an area of some 100 square miles. Prompt suppression to prevent further destruction has contained the outbreak and but little additional control work will be needed in 1961 to terminate the menace. A similar widespread epidemic in the upper Green River area in the

(*Continued on Page* 92)

Arcadian® News

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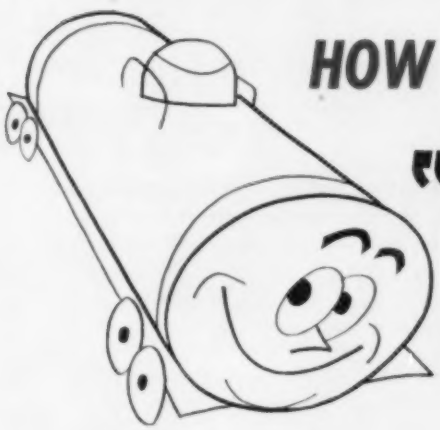
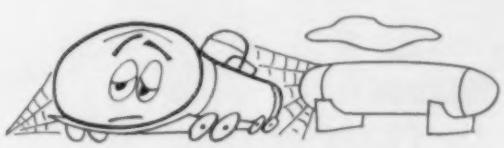


HOW YOU CAN HELP TO...

"GET ME TO YOUR PLANT ON TIME!"

This tank car makes an important point—*extra* important to you now that the rush season is here! As you know, Nitrogen Division produces a full range of nitrogen solutions in ample volume at strategic locations—more than enough to meet normal and peak demands. Moreover, the tank car fleet to transport this production is large enough to handle just about every situation. However, through combinations of circumstances, such as bad weather and emergency orders, it sometimes happens that tank cars are unavailable when wanted, and shipments are delayed. While no one can do anything to alter these circumstances, mixed goods producers *can* take that most important preventive measure: *fast turn-around* of tank cars. Or, as our little tank car character would say:

Everyone benefits where there is fast turn-around at both ends of the track. Nitrogen Division, as producer, can coordinate production and shipment better; while you, as consumer, can handle your peak demands more efficiently. But it's obvious that a tank car shortage hits mixed fertilizer producers hardest. That's why you should resolve to return tank cars as fast as possible.



"CAN'T DELIVER WHEN I'M IDLE"

Remember, a tank car sitting idle on your siding—or anyone else's—can't also be back at the Nitrogen Division plant, taking on that rush order you just placed!

Here are six practical suggestions, gathered from a wide range of fertilizer plants throughout the U.S., that

can help speed up turn-around of tank cars—and contribute to smoother operations in your plant, in the bargain.

❶ "KEEP ACCURATE RECORDS"

An accurate, running record of withdrawals from tank cars should be maintained at all times. This accomplishes the two-fold purpose of helping to control fertilizer analysis, and determining the instant a car is actually empty.

❷ "KEEP AIR PRESSURE UP"

Where a tank car is to be unloaded into a storage tank, maintain enough air pressure to make the transfer quickly. Check piping, pressure gauges, pressure governors, safety devices, and all other equipment for any bottlenecks or malfunctioning. Stay within the limits of permissible working pressures on tank cars and storage tanks. When some pressure relief valves operate, they may drop the pressure below a satisfactory working level, and valuable time can be lost while pressure is being rebuilt.

❸ "WATCH THOSE CENTRIFUGAL PUMPS"

If centrifugal pumps are used to transfer nitrogen solutions to storage, be sure to operate at the minimum practical pressure at the pump's discharge side. This type of pump delivers a great volume at low discharge pressures, but volume drops off rapidly as the pressure increases. For example, in many conventional centrifugal pumps, delivery volume actually drops to zero at fairly moderate discharge pressures.

❹ "MIX HIGH 'N' GRADES FIRST"

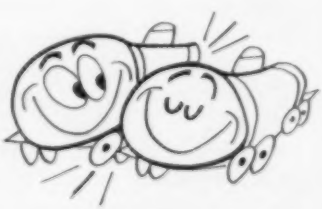
Where conditions permit, operators can empty tank cars faster by giving production priority to those grades which use up solutions rapidly. These include grades that consume large amounts of nitrogen solutions per ton; and those which use moderate amounts, but are mixed quite quickly. Another suggestion would be to have the simpler formulas mixed by less skilled work shifts, such as the night crew, rather than let the tank car sit idle very long waiting for a highly trained crew to start on a complicated mix.

❺ "AIM FOR THE NEXT PICK-UP"

If it can be arranged, it pays to push production a little beyond normal operating pace or hours, in order to empty a car for the next railroad pickup. Where this gets a car rolling over a week-end—so much the better! Your tracks are freed for action, and the possibility of any "salting out" problem is avoided.

IMPORTANT! *Mail your car release notice promptly,* so that Nitrogen Division can expedite the return of the car.

❻ "SOMETIMES TEAMWORK'S BETTER"



Some operators will, on occasion, empty out two cars simultaneously to prevent any interruptions in production that might delay workmen. Of course, care must be taken to see that solution does not pass from one car into the other, as this would disturb the accuracy of a running inventory, thus making it impossible to predict when either car will be emptied. As one might expect, there are certain safety hazards in multiple hook-ups, but since these are quite obvious, multiple discharge can be made as safe a procedure as the single car method.

You, yourself, with a little thought on the subject, could undoubtedly come up with more suggestions for effecting fast turn-around of tank cars. If you would like to discuss these with us . . . or get more information on any aspect of the transportation and use of nitrogen solutions, contact Technical Service, Nitrogen Division, Allied Chemical Corporation, 40 Rector Street, New York 6, N. Y.

Arcadian News for Fertilizer Manufacturers from Nitrogen Division, Allied Chemical

HOW TO MAKE SURE A SOLUTIONS TANK CAR IS COMPLETELY EMPTY

Failure to completely unload all of the nitrogen solutions from a tank car before returning the car to the nitrogen producer can result in serious difficulties for the fertilizer manufacturer.

Even when the fertilizer produced is up to grade, the cost of returning much solution is some times painful and often leads to controversy. The consequences are critical if the solution left in the car is related to under-proportioning, because the error may not come to light until the customer is informed through the routine check of the nitrogen producer.

Failure to use all the solution in the car may result in the production of large amounts of off-grade fertilizer, as well as the closely associated trouble of over-proportioning. In over-proportioning, the accumulation of shortages may cause a shocking predicament, if a running inventory is not used conscientiously. This is especially true when the solution goes through a storage tank.

Some operators show uncanny accuracy in predicting the point at which the tank car will be empty, whether working direct to process or to a tank. This is usually the result of highly-developed operating skills. These men know how many tons should be processed from each tank car or how long it takes to transfer the contents under certain working conditions. They strive for performance within one-half of 1% of mathematical perfection. They know that errors of 1% are cause for concern, especially when the car seems to be empty or is actually empty.

Usually the failure to empty the tank car is due to too little AIR pressure.

Experience may show that 30 pounds gauge pressure per square inch is required, when the tank car is full, to operate at a desired rate. When the tank car arrives, pressure is practically all vapor pressure from ammonia with very little from air. High pressure on arrival may be desirable but it is also deceptive because it is often at, or above, the pressure required for operation. It pays to depend on AIR pressure to get the desired results, rather than ammonia pressure. It is important to have the correct air pressure on the car at all times until it is completely empty.

Very little air pressure may be required to start an adequate flow and some operators see no reason for maintaining much more than this minimum pressure for the entire operation. That's why some cars are returned to nitrogen producers nearly full of solutions, and many half full.

One reason for inadequate air pressure is a limited volume of compressed air. Measuring tanks have a notorious appetite for compressed air, especially when it is necessary to vent off the air to refill them, which is often the case when handling large quantities of solution.

This problem can be avoided by having a measuring tank large enough to provide a "cushion" over the full charge of solution. Another "cushion" can be a separate pressure-safe aluminum or stainless steel tank above the measuring tank, connected with large equalizing pipes and the usual safety devices.

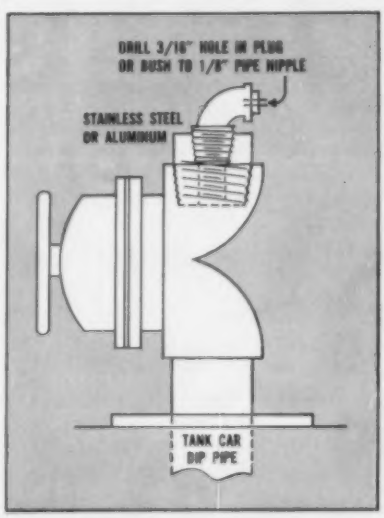
Frequent inspection and easy flushing with water is advised for both tanks. Increased air space may not be a satisfactory answer for the highest vapor pressures. Economy of air here would be in the opposite direction—by using small measuring tanks.

Faulty pressure gauges, absence of any gauge, or improperly placed gauges are other causes for error. But the most common error is the failure to maintain a little MORE air pressure on the car after three-fourths of the solution is removed, right down until the last gallon is removed. Many operators knowingly permit the pressure to decline at this point for reasons that are hard to understand.

A full car has about 3½ pounds more pressure on the solution at the bottom than at the top where the pressure is read. Each two feet of height exerts a pressure of about one pound per square inch. Under a uniform but narrow enough margin of air pressure, the pressure on the solution at the bottom when a low level is reached will be reduced enough that some ammonia will boil out of the nitrogen solution. This level has been as high as the middle of the car and is all too often at the quarter-full level.

During operation this gas volume sometimes creates the same noises, jerking movements of the hose, bubbles in gauge glasses and sight flow indicators and meters, as are created by the rush of air at the instant the car does in fact become empty. There is no easy way of determining whether the emptying symptoms are caused by air or by ammonia gas, if the air pressure is at a questionable point.

The importance of maintaining accurate running records readily available to the operator cannot be over-emphasized. Accurate pressure gauges, to be read only while there is no movement of air or gas past them, are very necessary.



The device shown above is a valve for checking to determine whether a solution tank car is completely empty. The dip pipe goes all the way to the bottom of the inside of the tank car.

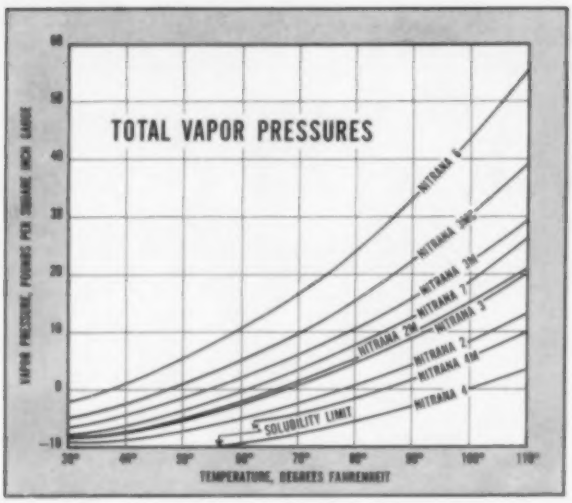
Follow this procedure:

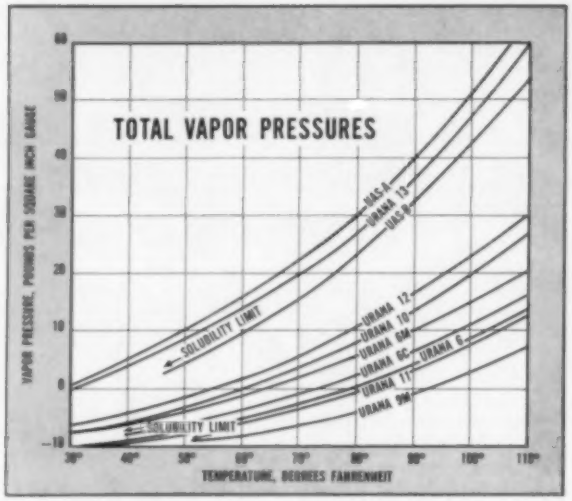
Consult record of car to determine whether it should be empty. Have pressure in car at least 10 pounds above the solution's vapor pressure at its temperature. Observe all pressure limitations and safety practices. See pressure-temperature curve for the particular nitrogen solution.

Open the valve (shown at left) only enough to produce full flow of liquid or gas through the 3/16-inch hole in plug or the 1/8-inch nipple. After 30 seconds, open valve one more full turn to apply full pressure. If full liquid stream flows for the next minute, the car is probably not empty. Consider influence of any liquid drained to car from piping or measuring tank. If air or gas flows freely for the next minute, with pressure as suggested, the car is probably empty.

Note: To avoid removing the solution hose, for the checking, install "T" with a valve ahead of the solution hose. Close this valve while checking to prevent influence of back pressure. Use a small valve on the small test piping. If small hose or much piping is used on test equipment, locate restriction at loose end to insure full pressure being applied at visual observation point.

These suggestions are offered with the belief that they will be helpful to the operator. Because of the many different conditions in fertilizer plants, Nitrogen Division, Allied Chemical Corporation, does not guarantee results from these suggestions.





When the car is three-fourths empty, there seems to be an irresistible temptation to "coast" or use the existing pressure in the car to finish it without adding more air. When sufficient AIR pressure exists at this point no bad results are experienced but the practice gets the operator in trouble eventually.

Sometimes many hours are lost while sufficient air pressure is rebuilt to resume operations. Sometimes much nitrogen solution is returned in the car. Realistically near the end of the car—about 5 pounds more air pressure should be added above the minimum necessary for the full car to compensate for the loss in static head of the liquid to hold the ammonia in solution and out of trouble. Always respect safe practices in general and watch the safety valve settings.

To be entirely free of any concern over pressures that result in return of ammoniating solutions in tank cars, it would be necessary to operate with solutions that have no more than zero gauge pressures. This would lead to some very unsatisfactory ammoniating solutions. Another alternative would be the impractical one of using the existing solutions at temperatures that would naturally provide zero gauge pressures. The temperature-pressure relation tables show that the following temperatures would meet this condition: NITRANA® 6—lower than 38°F... NITRANA 3MC —lower than 48°F... NITRANA 3 and 2M—lower than 68°F... and URANA® 12—lower than 55°F... and U-A-S®—A and B—lower than 30°F.

The more practical way is to understand what causes the trouble and use the correct solution to meet your requirements.

Here are some reasons why the car may be thought to be empty:

In measuring tanks the vent, that releases air so the tank can be recharged, sometimes becomes plugged. This stops the inflow at some short point.

Where the top or the bottom connections of gauge glasses become plugged, the actual flow into the measuring tank is not indicated in the gauge glasses.

Meters may become jammed or the holes in the distributor pipe plugged so no liquid can flow through the meter.

Pressure gauges may be faulty in themselves or poorly placed to lead to wrong conclusions. There may be too little air while the gauge shows ample pressure.

If pumps are used instead of air pressure, they can easily become vapor-locked from ammonia gas and all flow will cease.

Only slightly above normal operating pressures, some centrifugal pumps will abruptly cease to deliver any volume.

In hot weather or in changing to a nitrogen solution which has high vapor pressure, the possibilities of some of the foregoing problems arising are increased.

In extreme cases enough nitrogen salts will be precipitated in cold weather from some nitrogen solutions to plug the system and erroneously indicate that the car is empty.

If you have any questions on the proper handling of nitrogen solutions, contact Nitrogen Division, Allied Chemical Corporation, 40 Rector Street, New York 6, N. Y. Technical advice and assistance are available to customers without charge.

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AG CHEM LISTENING POST

by Paul Miller

This department, which reviews current plant disease problems, is a regular feature of AGRICULTURAL CHEMICALS. The comments are based on observations of collaborators of the Epidemiology Investigations, Crops Protection Research Branch, USDA, Beltsville, Md.

Test of Four Fungicides For Control of Cedar Blight

ACCORDING to Glenn W. Peterson, of the Rocky Mountain Forest and Range Experiment Station, Forest Service, United States Department of Agriculture, and David Nuland and John L. Weihing, of the University of Nebraska (1), cedar blight caused by the fungus *Phomopsis juniperovora* frequently causes severe losses of eastern red cedar (*Juniperus virginiana*) in forest tree nurseries in the Great Plains region. Phenyl mercuri triethanol ammonium lactate 7.5% (Puratized Agricultural Spray) has recently been used by nurserymen, but its effectiveness in the Plains region has not been properly evaluated. Peterson and his associates, therefore, tested it along with three other comparatively new fungicides for control of cedar blight in eastern red cedar beds in a nursery in eastern Nebraska. The other test chemicals were: a formulation containing 5% cadmium sebacate, 5% potassium chromate, 1% malachite green, 0.5% auramine, and 16% thiram (Kromad); 65% n-dodecylguanidine acetate (dodine); and a cycloheximide-PCNB formulation containing 1.3% beta [2-(3,5-dimethyl-2-oxocyclohexyl)-2-hyroxyethyl]-glutarimide and 75% pentachloronitrobenzene (Acti-dione RZ).

Test beds of 2-year-old and 3-year-old nontransplanted (2-0, 3-0) seedlings were sprayed nine times. Only the last six sprays were applied to 1-0 seedlings. The growing season was unusually wet and cedar blight became very prevalent in untreated 1-0 and 2-0 beds. In some 1-0 beds the disease was so severe that the seedlings were pulled out and destroyed. Incidence of the disease in 3-0 beds, however, was very light throughout the nursery.

Chemical treatment significantly reduced amount of disease in 1-0 and 2-0 beds but did not significantly affect incidence in 3-0 stock. Best control was obtained with Puratized Agricultural Spray. Dodine caused injury at the rate used for the first three applications, but was not toxic at the reduced dosage applied thereafter. The 1-0 seedlings received only the reduced dosage and were not injured. The cycloheximide formulation caused such severe chemical burn that no readings could be taken.

Lima Bean Downy Mildew

Bernard C. Smale and John W. Mitchell (2), of the Crops Research Division, Agricultural Research Service, United States Department of Agriculture, studied the effects of 9-(p-n-hexyloxyphenyl)-10-methyl-acridinium chloride (phenacridane chloride) and nine related compounds on the lima bean downy mildew fungus (*Phytophthora phaseoli*). Phenacridane chloride had been reported to possess antifungal and antibacterial properties but apparently its effects against plant pathogens had not been studied previously.

Under the greenhouse conditions of the tests, phenacridane chloride proved to be a highly effective protectant against lima bean downy mildew. Its action appeared to be fungicidal rather than fungistatic. Several of the related compounds were about equal to phenacridane chloride as protectants. Sprays containing 63 parts per million of the fungicidally active compounds gave essentially complete control of lima bean downy mildew. The active acridinium compounds were from four to eight times as effective as manganese ethylene bisdithiocarbamate (maneb) for downy mildew control.

None of the acridinium compounds exhibited therapeutic activity.

Phenacridane chloride caused injury at 2000 ppm but not at lower concentrations. The other acridinium compounds were not phytotoxic at 250 ppm, the highest concentration tested.

Smale and Mitchell emphasized that their report should not be interpreted as a recommendation for the use of phenacridinium compounds in the production of edible crops.

Potato Seed-Piece Decay

Roland F. Line and Carl J. Eide (3), of the University of Minnesota, conducted tests using some of the newer chemicals for treatment of potato seed pieces to prevent fungus and bacterial decay. Their results confirmed previous findings that in Minnesota chemical treatment of potato seed to be planted soon after cutting is seldom worth while, but if the cut

(*Continued on Page* 92)

AG CHEM

Fertilizer Views and News

by Vincent Sauchelli

Dr. Sauchelli is a Consultant to the Agricultural Chemicals Industry.

Precision In The Use Of Minor Elements

THE haphazard use of minor elements—and major elements for that matter—may lead to difficulties. This has been previously mentioned in these columns. It bears repetition since the same mistakes, it seems, are being repeated. A review of some instances may help to emphasize the potential harm from injudicious applications – under certain conditions.

At one time, a copper deficiency was a serious, common problem in the Florida citrus industry. The problem was solved effectively through the application of copper sulfate to the orchard soil, or Bordeaux spray to the foliage. The treatments were standard practice until quite recently. The steady application of these copper salts on the light sandy soils of Florida gradually built up to levels that resulted in iron deficiency in the trees, and caused stunted and an abnormal growth of roots in the topsoil. A similar result seems to occur where continuous, heavy applications of soluble phosphorus compounds build up an unusually high residue of phosphorus capable of combining with available iron, and thus prevent the ready absorption of both the iron and phosphorus by the crop.

Apparently copper, as well as phosphorus, can be fixed by soil agencies and remain permanently in the top soil. According to local authorities, current practice in Florida puts definite limits on the total amount of copper that may be used on virgin soils already low in copper content. In the case of old groves, the application of copper should be done cautiously if they have a history of heavy copper treatments. This is merely good, common sense.

Another example calling for discretion involves the application of magnesium to groves known to be deficient in this element. Magnesium deficiency of citrus and other crops was, until 1940, very common in Florida and other areas of the Coastal Plains soils of the Atlantic seaboard. The problem developed gradually in Florida as fertilizers formulated with large quantities of organic materials known to be rich in magnesium were replaced by non-organic chemical fertilizers having a high content of potash (3-8-8 or 4-6-8 grades). The change-over in time resulted in a serious deficiency of magnesium in many of the older groves. In some cases, as much as 1½ tons per acre per year of this fertilizer was applied to mature groves. This produced an imbalance in magnesia. Soil scientists explain that potash can interfere with the uptake of magnesia. In other words, the citrus tree will prefer to feed luxuriously on the potash at the expense of magnesium. Many Florida groves are reported now as applying at least one half as much soluble magnesia (MgO) as potash (K_2O) in mixed fertilizers and, in addition, about 1500 pounds per acre per year of dolomitic limestone. Magnesium deficiency in Florida groves is in this way effectively overcome.

These practices simply illustrate the importance of knowing more precisely what is the best fertilization to follow under specific conditions. Where soil tests are properly correlated with field tests and local farmer experience, fertilization becomes more precise and underscores the slogan: *Don't guess; soil test!* ★★

Cloth Bag Dust Filters in Fertilizer Plants

BECAUSE of the hygroscopic and corrosive nature of fertilizers, the history of cloth bag dust filters in fertilizer plants has been marked by a succession of problems: inefficient dust collection, costly maintenance, frequent filter bag replacement.

The problem centers around the fertilizer bagging operation, with dust being created at the bagger hood, weigh hopper, storage bin, screen, elevator and dump hoppers.

Bags in dust filters serving these points often are plugged up with the moist material. The bags have to be brushed and, often, washed by hand to dislodge the corrosive fertilizer dust. Even when done on a regularly scheduled basis, however, such maintenance does not prevent premature bag wear, nor provide for effective dust suppression.

According to R. L. Clement of W. W. Sly Mfg. Co., Sly engineers

(*Continued on Page* 86)

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P-19

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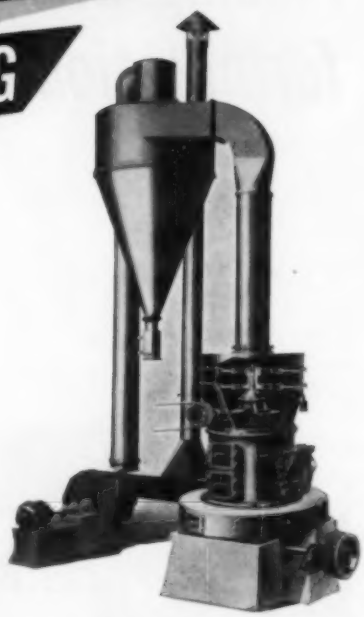

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NEWS ABOUT THE AG CHEM TRADE

139th National ACS Meeting In St. Louis March 22 to 31

THE metabolism of pesticides and food additives in man and animals will be one of the main topics for discussion at the 139th National Meeting of the American Chemical Society, March 22 to 31, in St. Louis, Mo. Also to be studied by the Pesticides Subdivision of the Society are new trends in pesticide formulations.

A series of symposia on the metabolism of pesticides will be presided over by R. D. Radeleff, Louis Lykken, and S. A. Hall. Among speakers will be Frederick W. Plapp Jr., "Metabolism of Organo-phosphate Insecticides"; Claude H. Schmidt, "The Fate of Diethyltoluamide in Man and Animals"; Albert A. Kindritzer, "Survey of Metabolism of Organic Phosphorous Insecticides in Higher Animals"; and E. Y. Spencer, "The 'Irregular' Selective Toxicity of Some Organophosphorous Compounds."

Also, R. D. O'Brien will discuss the metabolic basis for low-hazard insecticides. John P. Frawley is to present an appraisal of the practical value of metabolic studies to proof of safety of pesticides and food additives. And, James G. Miller will discuss comparative intermediary metabolism.

Among those appearing on the symposium about new pesticide formulations are: James W. Miles, "Stable Formulations for Sustained Release of DDVP Vapors"; James W. Hansen, "Liquid Pesticide Formulations: Past, Present, and Future"; and L. L. Danielson, "Herbicidal Activity of Granular Formulations."

All sessions of the Division of Agricultural and Food Chemistry are to be held in Kiel Auditorium.

Luman Joins B & B

Virgil C. Luman has joined Bradley & Baker, New York, as a sales representative in the states of Iowa, Nebraska, Colorado, Kansas, and Missouri.

•

Figures released by the U. S. Tariff Commission last month indicate that 1960 production of pesticides and other organic agricultural chemicals reached 637 million pounds, 9 per cent higher than the 1959 figure. The commission says that 1960 sales of pesticides were valued at $253 million, compared with $225 million in 1959. DDT was the biggest quantity item, with production at 164 million pounds in 1960, a new record.

•

Chemico Moves Offices

Chemical Construction Corp., has moved to 320 Park Avenue, New York. The company had been at 525 W. 43rd Street in the same city. The firm now occupies the second, third, and fourth floors of the new 33-story Uris Brothers building. The new offices serve as international headquarters for the executive, engineering, and sales staffs of the company.

•

California Fertilizer Conf.

The ninth annual California Fertilizer Conference will be held on the Kellogg-Voorhis Campus of California State Polytechnic College, Pomona, March 27 and 28.

The program will feature micro-nutrients and nitrogen. A panel discussion on micro-nutrients will be held and the delegates also will participate in a panel discussion on nitrogen, with R. L. Luckhardt, Collier Carbon and Chemical Corp., Los Angeles, moderating. Both panels will consist of University and industry people.

•

Kraft Appoints Jones

Tom L. Jones

Tom L. Jones, formerly special representative for Kraft Bag Division of St. Marys Kraft Corp., subsidiary of Gilman Paper Co., has been appointed sales manager in charge of multiwall bag sales. His headquarters are in New York.

Prior to joining Kraft Bag, Mr. Jones had been vice president and director of multiwall sales for Arkell & Smiths.

•

Thompson-Hayward Sold

The board of directors for Thompson-Hayward Chemical Co., Kansas City, Mo., has approved an agreement to sell the company's assets to Consolidated Electronic Industries Corp. Although details of the transaction have not been disclosed, no changes reportedly are contemplated in the operation or management of Thompson-Hayward.

Food Industry Must Get Its Story Before Consumer

THE food industries, the chemical manufacturers, and all concerned with the welfare of the food industry and the consumer must embark on an educational program to get the true facts before the consumer, Dr. Emil M. Mrak, Chancelor, University of California, Davis, told the 54th annual convention of the National Canners Association, Chicago, Ill., January 24.

Dr. Mrak said that this program must be a broad spectrum one and must be well planned and carried out over the years to hit all segments of our population. He warned, however, that "In doing this, we must think in terms of what people will read and what they will not read." Considerable literature, he pointed out, has been published during the past few years on the goodness of our food supply but most of it has been extremely drab, boring, or at the least uninteresting. "Most certainly," he said, "we must make available information that is as interesting and as exciting to read as the book by (William) Longgood entitled *Poisons in our Food*."

Talking of food chemistry, Dr. Mrak said, "I cannot help but wonder that if the caveman initiated his process of drying food over a smoking fire today and was confronted with our modern food laws and the enforcement of them by the Food and Drug Administration, if he wouldn't have a great deal of trouble proving the harmlessness of the smoke constituents absorbed by the food during drying."

Emphasizing the crucial importance of chemicals to successful agriculture, Nelson H. Budd, director of information for the National Canners Association, Washington, D. C., said that every farmer working an acre of land today has to feed approximately three times as many people as that farmer and acre fed 50 years ago. Much of the explanation . . . lies in agricultural chemicals — the proper chemicals, properly used." The problem is not to eliminate the use of chemicals, he said, but to use the safe ones wisely.

•

Riemer Pres. U. S. Borax

Hugo Riemer, former executive vice president, has been elected president of United States Borax & Chemical Corp. and James M. Gerstley, former president has been named vice chairman of the board.

Mr. Riemer joined the company as executive vice president in October, 1958. He moves into his new position with a solid background of managerial experience in the chemical industry. From 1935-58 he was associated with Allied Chemical Corp., New York City. Initially, Mr. Riemer was a senior attorney in the chemical firm's legal department, then moved into the management field as assistant to the president of Allied's Solvay Process Division. Subsequently, he served as vice president and then as executive vice president of the division. His last post at Allied Chemical was as president of the Nitrogen Division, from 1953 until his departure in 1958.

Washington Group Formed

Following an all-day meeting at the Chinook Hotel in Yakima, Wash., last month, representatives of national pesticide manufacturers, local distributors, and dealers from the state formed the Washington Agricultural Chemicals Coordinating Committee.

Elected as officials were: R. E. Jones, Norkem Corp., Yakima, chairman; Sidney Martin, Yakima Valley Spray Corp.; vice chairman; and Robert Johnson, General Chemical Co., secretary. The aim is to "cope with problems of the agricultural chemical industry, not only pertaining to manufacturer, distributor, and dealer . . . but also to the farmer-user."

•

Rename Canadian Affiliate

Morton Chemical of Canada is the new corporate name of Panogen of Canada Ltd., Winnipeg. The name change has been made to correspond with the company's U. S. affiliate, Morton Chemical Co., Chicago.

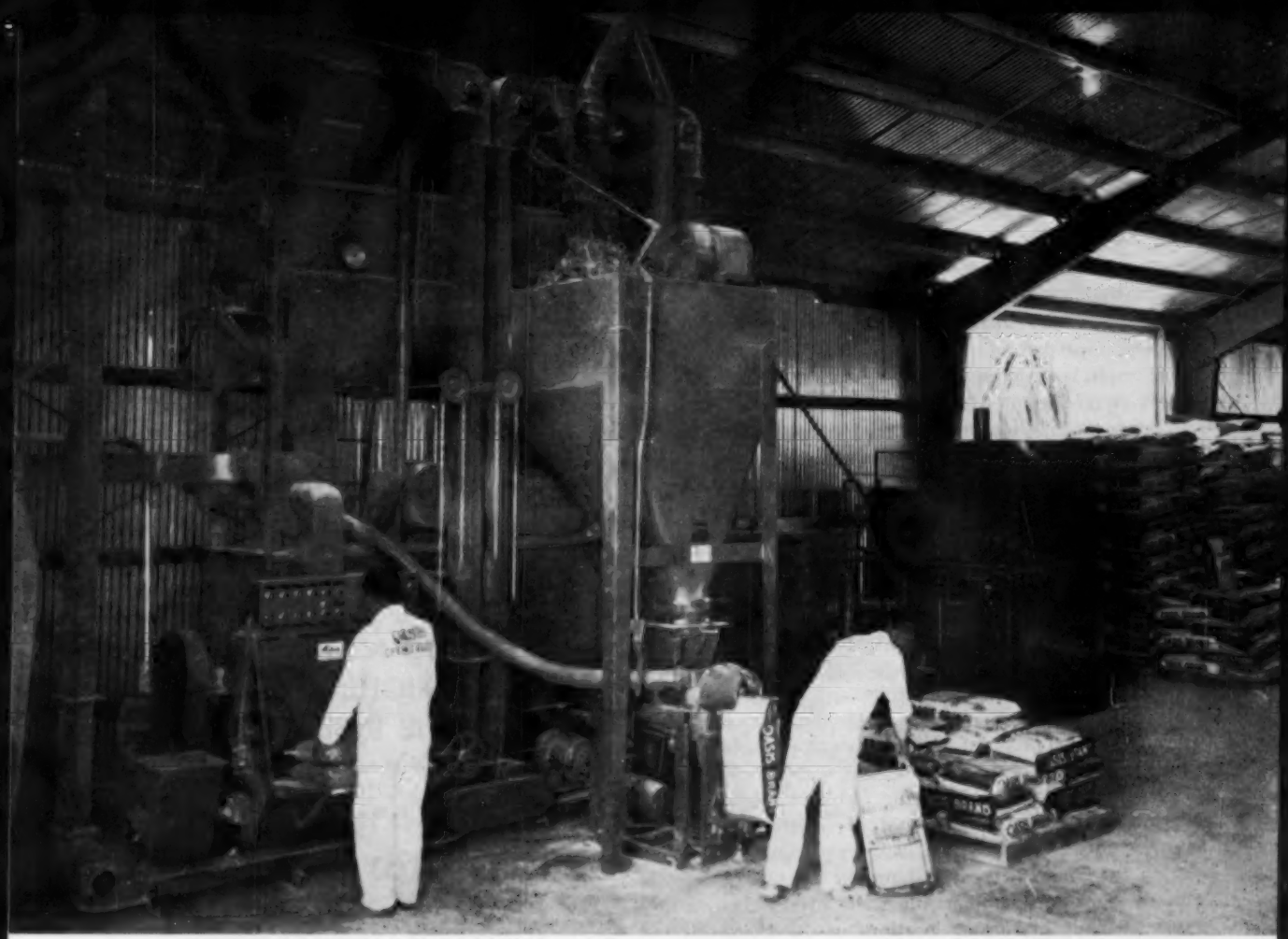
Power To Produce For Peace Is Theme Of U. S. Exhibit

THE story of America's highly efficient agriculture will be portrayed in seven step-by-step sections in the U. S. exhibit at the International Agricultural Exhibition in Cairo, Egypt, March 21 to April 21. The theme of the U. S. exhibit is "Power to Produce for Peace."

The seven sections will be labeled: "Wise Use of Resources," "Role of Research," "Education and Information," "New Age for American Agriculture," "Marketing Farm Products at Home and Abroad," "Community Action," and "Food for Peace." A 90-second introductory sound movie will precede each section, explaining in Arabic the exhibit to follow. The exhibits will be housed in three principal buildings and an open area.

In the research section, fertilizers, pesticides, and growth regulating chemicals will be described and examples of their use and benefits will be displayed.

Architects drawing of U.S. Exhibit at the International Agricultural Exhibition in Cairo, Egypt, March 21 to April 21. The U.S. exhibit covers 2.2 acres and will be the third largest in the exhibition.



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Stauffer Chemical Co.	Richmond, Calif.
American Potash & Chemical Co.	Los Angeles, Calif.
Cotton States Chemical Co., Inc.	West Monroe, La.
Pennsalt Mfg. Co. of Wash.	Portland, Oregon
Thompson-Hayward Chemical Co.	Lubbock, Texas
Tide Petroleum Prod. Co.	Edenburg, Tex.
Diamond Alkali Co.	Cleveland, Ohio

EXPORT

Pennsalt International Corp.	Mexico City
Stauffer de Mexico, S.A.	Culiacan, Mexico
Niagara Chemical Division	Culiacan, Mexico
Tropical Agriculture, S.A.	Havana, Cuba
Geigy Do Brasil, S.A.	Rio De Janeiro, Brazil
DuPont (Peru) S.A.	Callao, Peru
Compania De Petroleo Shell de Columbia	Barranquilla, Colombia
Allied Chemical Services Ltd.	Calgary, Canada
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Idaho Fertilizer Industry Meetings

Approximately 300 fertilizer dealers, industry representatives and personnel from the University of Idaho attended the Idaho Fertilizer Industry Meetings held last month at Caldwell, Twin Falls, Pocatello, Rexburg, and Moscow. One of the highlights of the program was a panel on soil testing that featured both industry and college personnel.

William Priest, Jerome County Agent, said that the management capability of the farm operator is an important part of any fertilizer recommendation. The better farmers, he explained, can use more fertilizer more efficiently than an average operator "and we try to make allowance for this in our recommendation." James Whiteley, field representative for Balfour Guthrie, stated that soil testing was basic to the proper utilization of fertilizers. "I believe," he said, "that there should be more correlation between the tests run by the college and those run by private industry so the farmer will be less confused by the wide range in values he sometimes obtains from different labs."

Keith Campbell, agronomist for Western Phosphates, emphasized the importance of the dealer in soil testing programs. "It is up to the dealer to follow through on the program with the proper formulations and to supply pertinent information to help the farmer get full value from the fertilizer recommendation," Mr. Campbell said. Merle Switzer, western representative for the TVA, also emphasized the position the dealer plays in the proper use of fertilizer on the farm. In summarizing some of the fertilizer surveys made in various locations in the U. S., Mr. Switzer stated that "The farmer looks to the dealer to give him the key information to realize net profit from his crops."

The Idaho Fertilizer Industry meetings were sponsored by the Pacific Northwest Plant Food Association.

•

NAC Sets Meeting Site

The 28th annual meeting of the National Agricultural Chemicals Association will be held at The Homestead in Hot Springs, Virginia, October 29 to November 1.

•

Fungicide Test Results Available

The "Results of 1960 Fungicide and Nematocide Tests" now is available. Issued annually by the American Phytopathological Society, Subcommittee on New Fungicide and Nematocide Data, the report serves as a medium for organizing and presenting the summarized results of current fungicide and nematocide testing projects.

Copies of the report are available at $1 per copy when accompanied by a remittance, $1.25 when invoiced and billed. Orders should be addressed to A. B. Groves, Winchester Fruit Research Laboratory, 2500 Valley Avenue, Winchester, Va.

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Nitrogen Industry's Problems Told

Norman E. Hathaway, executive vice president of the Nitrogen Division of Allied Chemical Corp., New York, told the regional meeting of the American Coke & Coal Chemicals Institute in Chicago, February 9, that the nitrogen industry is suffering from bad timing and poor locations. He said that some states in the midwest are producing more nitrogen than they can use and, of these, some are even bringing in material from the outside.

The midwestern area of Nebraska, Iowa, Missouri, and Oklahoma, he said, is a case in point of expansion of new facilities without too much regard for proper market research. "There have been new nitrogen facilities announced or built during the past two years," he said, "at Joplin, Mo., Lawrence, Kansas, Fort Madison, Iowa, and Hastings, Nebraska, resulting in a production in these four states in 1961 of 628,000 tons vs. a consumption of 413,000 tons in 1960."

Mr. Hathaway also commented on the fluctuating price situation. Nitrogen, he said, is one of the few chemicals that in the past few years had a fluctuating seasonal price. To put the price on a constant basis, he recommended larger producer-owned storage capacity, both for liquid and solid products. Storage costs less than increased nitrogen capacity, he pointed out. The only way to take care of peak demand, and more importantly, slack demand, he said, is to have some place to put the production.

•

Annual CSC Sales Meeting Held

The Agricultural Chemicals Department of Commercial Solvents Corp., New York, held its annual sales meeting Jan. 31 to Feb. 1 at the Frances Hotel in Monroe, La. Loy Everett, manager of the department, was in charge of the meeting.

Included on the program were representatives of the National Plant Food Institute who discussed the subject "Opportunities for Profits." The speakers were Dr. Robert Beacher, director of the NPFI southern region, Atlanta; Zenas Beers, midwest regional director, Chicago; and E. K. Chandler, staff representative of Shreveport.

•

Bird Hazard To Aircraft

The U. S. Department of the Interior, Fish and Wildlife Service, Bureau of Sport Fisheries and Wildlife, has published Wildlife Leaflet 429—a study of the hazards presented by the proximity of birds to airports. Birds have been known to cause accidents when drawn into jet engines of aircraft taking off and landing.

Among the remedies for the problem suggested in the leaflet are the elimination of weeds around airports and the elimination of insects that might attract birds.

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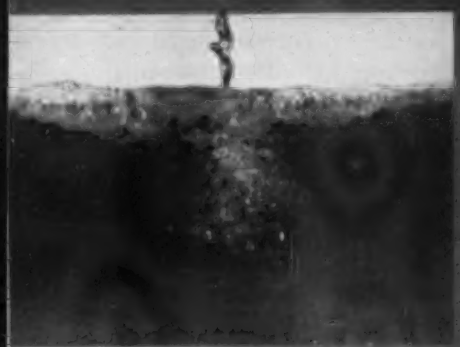
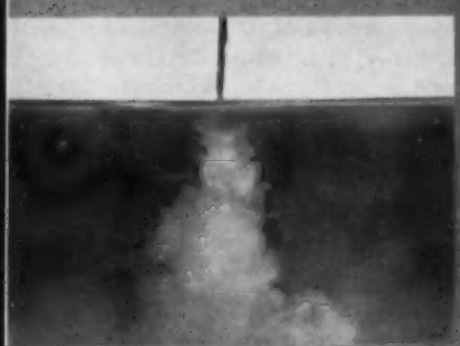


1 Two immiscible phases separate immediately when a hydrocarbon solvent containing no emulsifier is poured into water.



2 The same solvent containing 3% of a poorly balanced blend of anionic-nonionic emulsifiers forms only a fair emulsion in water.

3 The spontaneous "bloom" of a good emulsion dispersing in water results from the perfect balance of an Emcol emulsifier at the same 3% concentration.

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Forms Research Facility

Dr. Floyd M. Mizell, former president of Tower Chemicals, Inc., Pittsburgh, Pa., has established an independent research and development company known as the Florida Institute of Tropical Research, Ft. Lauderdale, Fla.

The functions of his organization are unique in that services are offered which probably cannot be found elsewhere. They cover activities from the creation of new and different products, to the field testing of established products. There are many problems found in the tropical conditions of South Florida that are not consistent to other areas of the country, Dr. Mizell points out. Besides research and development, Dr. Mizell offers technical representation in the South Florida and Caribbean area to the agricultural chemical industry.

•

Federal Names Managers

Roland Winter, who has been in charge of northern Illinois sales for Federal Chemical Co., Louisville, Ky., a division of National Distillers & Chemical Corp., and manager of Federal's Rockford, Ill., warehouse, has been named sales manager. In addition, James Edwards, for the past seven years general foreman of Federal's Louisville plant, has been appointed production manager at the company's newly-acquired Whitewater, Wisconsin plant.

Federal purchased the Whitewater plant last month from the Wisconsin Farmco Service Cooperative.

•

USPP Appoints Niles

Owen A. Niles Jr. has been appointed technical service representative for U. S. Phosphoric Products, Division Tennessee Corp., Tampa, Fla. He will serve the New England and mid-Atlantic states from headquarters in Baltimore, Md. Mr. Niles has been with USPP since 1948.

•

Canada Plant Ships Urea

The initial shipment of urea fertilizer took place recently from the new plant of The Consolidated Mining and Smelting Co. of Canada Ltd. at Calgary, Alberta. The plant has a rated capacity of 100 tons. Urea produced at the plant is available in both prilled and solution form.

•

CFA Meeting Nov. 12-14

The 38th annual Convention of the California Fertilizer Association will be held at the Jack Tar Hotel in San Francisco, November 12 through 14. 500 persons are expected to attend from all over the United States, and from Canada and Mexico.

Robert White Retires

Robert White has retired as general manufacturing manager for Armour Agricultural Chemical Co., Atlanta, Ga. He had been with the company for 42 years.

Mr. White was named general superintendent of all Armour's fertilizer operations in 1934 and had served as general manufacturing manager since 1955. He is being retained as a consultant for Armour.

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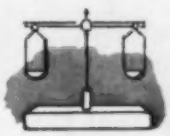

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Increased Herbicide Use Called For At California Meeting

"WE have the equipment, the chemicals, the personnel and the know-how to effectively control weeds in California, yet we do not put these resources to work," Dr. Guy F. MacLeod told 500 persons at the California Weed Conference in Fresno January 24 to 26.

Dr. MacLeod, chairman of Food Machinery and Chemical Corp., Fresno, stated that the use of chemicals to control weeds is not progressing as rapidly as it should. "As an example, only 10-12 percent of the sugar beet acreage in California is chemically treated for weeds, and this is not because the other 80 percent is free of weeds," he explained.

Oliver A. Leonard, a botanist at the University of California at Davis, was elected to succeed outgoing president Stanley W. Strew, Colloidal Products Company, Sausalito. The new vice president is Charles C. Siebe, State Department of Agriculture representative at La-Puenta. William L. Hopkins, Agri-Chem Industries, Davis, was elected secretary, and James Dewlen, AmChem Industries, Riverside, was named treasurer.

Charles A. Paul, newly appointed State Director of Agriculture, pledged the continuing support of the department to the weed control problem in California.

In discussing the organization of weed control districts, James W. Koehler, assistant chief of the State Bureau of Weed and Rodent Control, stated that weed abatement districts can be formed under the provisions of the State Health and Safety Code, but successful operation depends on vigorous leadership.

Thousands of dollars in weed control programs can be saved by cities, counties, school districts and other municipal groups if they use the knowledge and experience of weed control personnel in their areas," according to Si Dudley, Deputy Agricultural Commissioner of Orange County. He said that urban weed control by chemical means is fast becoming necessary due to restricted burning in many cities and counties because of air pollution regulations.

During a panel discussion on perennial noxious weeds, Warren V. Johnson, district supervisor of Weed and Rodent Control, California Department of Agriculture, reported that the use of soil sterilants is unsatisfactory in areas of low rainfall unless supplemented by irrigation to move the chemicals into the root zone.

Lauren M. Burtch, Spreckels Sugar Company representative from Woodland, said that the primary research needs of the future should define better methods of utilizing pre-emergence materials more effectively so that consistent weed control can be achieved.

"Major emphasis has been placed on detecting new weed species before infestations have become large enough to constitute a serious weed problem," T. C. Fuller, State Department of Agriculture, said. Evaluation of these new weeds is then followed by an appropriate weed control program, Mr. Fuller reported.

Greece, Viet Nam In Market

Greece and Viet Nam each entered the world markets last month for large quantities of chemical fertilizers. According to the U.S. Department of Commerce, Greece is inviting offers to supply some 66,630 tons of fertilizer materials and Viet Nam is seeking 35,600 tons of materials. At the same time, the Korean government opened bids for the purchase of about 66,900 tons of various nitrogen materials, potassium sulfate, and mixed fertilizers.

•

Russell M. Jones Retires

Russell M. Jones, director of technical service for Allied Chemical Corp.'s Nitrogen Division, retired January 31 after 30 years of service with the company. Mr. Jones has been director of technical service since 1958.

•

Western Distributor Formed

W. Jackson

R. J. Davidson

Harrisons & Crosfield (Pacific) Inc. has been founded with offices in Seattle, San Francisco, and Los Angeles. The new company is a consolidation of the western offices of Harrisons & Crosfield (America) Inc. and Wharton Jackson Co. The company supplies industrial raw materials, chemicals, and pharmaceuticals from domestic and overseas affiliates.

Harrisons & Crosfield are the exclusive distributors for Sherritt Gordon Mines' ammonium sulfate and Harrisons & Crosfield (Pacific) are the exclusive distributors in all of the western states for the Milwhite Co.'s attapulgite clay granules and dust.

Among the officers of the new company are Wharton Jackson, vice president at the Los Angeles office, and R. J. Davidson, vice president located at Seattle.

•

Washington Weed Conference

The 1961 annual Weed Conference of the Washington State Weed Association will be held in Yakima on November 6 and 7. The meeting will be held at the Chinook Motel and Tower.

Among subjects to be discussed are new developments in herbicides and up-to-date methods of application. Speakers will include representatives of various companies.

•

Pearce Joins Poulsen

Bernard W. J. Pearce has been named general manager of Poulsen Co., Los Angeles. He had been associated with Vibro-Equipment Division of Southwestern Engineering Co., Los Angeles, and was western district manager in charge of sales for the Patterson Foundry and Machine Co.

Mr. Pearce is in charge of engineering and sales for Poulsen Co., manufacturer of "Ready-to-Run" units for the processing and blending of wet or dry materials.

Monsanto Begins Production

Monsanto Chemical Co., St. Louis, Mo., has started production at a manufacturing plant in Monsanto, Ill., of 2,4-D and 2,4,5-T esters. The facility has been under construction since last November.

•

Gilman Subsidiaries Merge

Kraft Bag Corp., New York and St. Marys Kraft Corp., St. Marys, Ga., have merged and the operations of Kraft Bag now are conducted as the Kraft Bag Division of St. Marys Kraft Corp., Subsidiary of Gilman Paper Co., New York.

•

Great Phosphate Advances

Greater advances have taken place in the technology and production of phosphate fertilizers in the United States in the past few years than in all of its earlier history, and new advances appear in the offing, L. B. Nelson, manager of TVA's office of agricultural and chemical development, said February 1 at the annual meeting of the Soil Science Society of North Carolina at Raleigh.

Dr. Nelson said that the country now is producing about 16 million long tons of phosphate rock per year, of which about 60 percent is used in fertilizers. Phosphate consumption, he said, undoubtedly will continue to increase in response to the needs for more efficient farming. In addition, he predicted, the trend toward higher analysis of mixed fertilizers will continue.

•

New Trade Show

A new trade show, to be called Agricultural Engineering Exposition, will be held in Chicago in conjunction with the 1961 winter meeting of the American Society of Agricultural Engineers. A display and demonstration of equipment components and new products will occupy the exhibit hall of the Palmer House from December 12 through 14.

Davison Expands Mine

W. R. Grace & Co. Davison Chemical Division has completed extensive modernization and expansion of phosphate rock mining facilities at its Bonny Lake mine at Ridgewood, Fla. This modernization followed the closing of the Davison Pauway No. 4 mine near Lakeland, Fla., after nearly 40 years of operation.

•

Glyodin As Wetting Agent

Union Carbide Chemicals Co., Division of Union Carbide Corp., New York, reports that recent tests in Virginia have indicated that a combination of 40 ounces of Glyodin plus 0.6 pound of Ferbam per 100 gallons of dilute spray give the best control of cedar apple rust on apples. In this case, Union Carbide reports, the Glyodin acts as a wetting and sticking agent. Glyodin has little effect by itself on cedar apple rust; it does, however, add scab protection to the combination.

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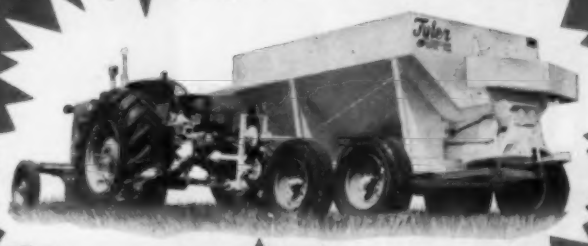

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Wheel Bearing	Sealed Timkin Bearing
Capacity	2½ Ton
With Body Extension	19 in. 4 Ton
Spread Pattern	Approx. 45 Ft.
Spread Capacity Pr. Hr.	30-60 Acres
Field Speeds	
6 M.P.H.	30 Acres Pr. Hr.
12 M.P.H.	60 Acres Pr. Hr.
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Russia To Boost Production

Following two disappointing crop years in the Soviet Union, Premier Khrushchev last month demanded greater production of mineral and organic fertilizers, herbicides, and other agricultural chemicals. He said that agricultural development in Russia has not kept pace with industry at a time when "our country has such mighty industry, such mighty defenses, that we are able . . . to assign more money for the development of agriculture" without detracting from other national programs.

The Communist party agricultural assembly has ordered all Soviet republics to "urgently" increase the production of fertilizers and other agricultural chemicals.

•

Carbide Advances Yoder

D. M. Yoder has been appointed to the agricultural chemicals Technical Development Group, Union Carbide Chemicals Co., Division of Union Carbide Corp., New York. His headquarters are in New York.

Dr. Yoder, who has been with Union Carbide for ten years, had been administrator of the company's agricultural research station at Clayton, N.C., since March, 1959.

•

Texas Gulf Appoints

Hugh W. Strickland and Charles F. Fogarty, previously vice presidents, have been named senior vice presidents of Texas Gulf Sulphur Co., New York. In addition, Bachmann G. Bedichek, assistant secretary, has been named senior counsel and Harold B. Kline, administrative assistant, has been elected secretary of the company.

Mr. Strickland will have charge of sulphur production for the company and Dr. Fogarty is responsible for Texas Gulf's exploration activities and for the company's new $25,000,000 potash project in Utah.

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Antara Names Distributors

Hoosier Solvents and Chemicals Co., Indianapolis, Indiana, has been appointed distributor for "Igepal" surfactants and "Cheelox" chelating and sequestering agents throughout Indiana by Antara Chemicals, a Division of General Aniline & Film Corp., New York.

Other distributors named by Antara for the two product lines include Central Solvents and Chemicals Co., Chicago, and Wisconsin Solvents and Chemical Co., Milwaukee.

•

Joint Entomological Meeting

The eleventh annual meeting of the Entomological Society of Canada and the tenth annual meeting of the Entomological Society of Quebec will be held jointly at Quebec, P.Q., October 23 to 25.

•

Pest Control School

The first school devoted to training in the pest control field recently was formed in Chicago. Known as the Elston School of Pest Control, the school offers correspondence and residence instruction in all phases of structural pest control. Dr. J. J. Davis, formerly head of the Department of Entomology, Purdue University, is director of the school.

•

Armour Lists Appointments

Frank Dunbar, formerly assistant general superintendent of Armour Agricultural Chemical Co., Atlanta, Ga., has been named manufacturing manager of the firm's nitrogen-phosphate division. At the same time, H. E. Naune has been appointed project manager of the company's ammonia and complex-fertilizer plant to be constructed near Sheffield, Ala.

Other personnel changes announced by the company include the appointment of Grant F. Davis as manager of the Crystal City, Mo., ammonia and derivatives plant, to succeed Mr. Naune. Also, Harold N. Herdick has been named works manager of all of Armour's phosphate rock operations in Florida.

Huber Names Courtney

Philip L. Courtney has been named vice president in charge of the clay division of J. M. Huber Corp., New York. He succeeds Wilbur J. Driver, who retired last month after 34 years with the company.

Charles H. Marvin Jr., manager of South Carolina operations, was named assistant vice president, and Frank M. Gribble has been appointed general manager of the Georgia operations. Simultaneous with these appointments, the headquarters of the clay division have been transferred from Langley, S. C., to Huber, Ga.

•

Re-Opens Green Bay Office

R. W. Phillips has resigned his position as manager of the Chemical Engineering Service division of Manitowoc Shipbuilding Inc., Manitowoc, Wisc., in order to re-establish his former business, the Chemical Engineering Service Inc. in Green Bay.

BOOK REVIEW

Chemistry and Technology of Fertilizers, edited by Vincent Sauchelli. Published by Reinhold Publishing Corp., New York. 704 pages, price $18. *Reviewed by Howard T. Rogers.*

This Monograph of the American Chemical Society is a very detailed and thorough treatment of the various processes used in a vigorously growing fertilizer industry. The different chapters are authored by chemical engineers and other technical personnel in the industry and in governmental agencies doing research and development work in fertilizer technology. The book is written primarily for engineers, chemists and management and operational personnel in the industry. It will be an excellent reference book for college students – engineers, chemists and agronomists particularly – interested in the manufacture, distribution and use of plant nutrients. Sales personnel in industry will find the historical development of various processes, problems in manufacture, and chemical and physical properties of the products valuable information in their day to day activities. Appropriately, discussions of agronomic properties of the various materials, based on crop responses, are restricted to generalizations. Coverage of a wide range of topics from plant construction materials to structural data on the chemical compounds found in fertilizers make this an excellent "source" book for both research and production personnel. Agricultural workers will find it useful as a reference on raw materials, properties of chemical fertilizers and trends in the industry.

Mr. Rogers is head of the agronomy and soils department, Auburn University, Auburn, Ala.

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AG CHEM

Equipment, Supplies, Bulletins

Velsicol Bulletins

Velsicol Chemical Corp., Chicago, has prepared a formulation manual for Parathion (technical) and Methyl Parathion and a technical bulletin on Methyl Parathion Dusts.

Formulation Manual 514-1 describes physical and chemical properties of Ethyl Parathion and Methyl Parathion together with formulating procedures, and storage, handling, and container requirements. Bulletin 514-3 discusses the factors which cause breakdown of Methyl Parathion dust formulations and suggests procedures which will minimize losses of active ingredient content.

•

Clark Hand Trucks Brochure

An 8-page, two color brochure (Bulletin SS-777) describing four low-lift platform models of "Powrworker" battery powered hand trucks has been published by Industrial Truck Division, Clark Equipment Company, Battle Creek, Mich.

The trucks, with five inches of lift, are designed for fast horizontal movement of palletized materials. Models described have capacities of 4000, 6000, 8000 and 10,000 lbs.

•

Automatic Fertilizer Mixer

Smith Precision Products Co., South Pasadena, Calif., is offering Measuremix automatic liquid fertilizer dispensers to fit 3-, 4-, and 6-inch water pipe sizes, in addition to ¾- and 2-inch models. With all models, the mixing of fertilizer and water in proportions is automatic and makes the use of power equipment unnecessary as the mixing action is accomplished by the flow of water in the pipeline.

A new catalog describing the complete line of Measuremix units is available from the company at 1135 Mission St., South Pasadena.

•

Closure Equipment Offered

Modification equipment for Union Special sewing machines has been developed by West Virginia Pulp and Paper Co., New York, that will enable manufacturers and users of multiwall bags to apply in their own bag plants the new ImpacTape sewn closure. The ImpacTape modification equipment has been specially designed for both H and E heads of Union Special Series 80600 sewing machines.

ImpacTape, which helps reduce bag breakage at the sewing line, was introduced by West Virginia about two months ago.

•

All-Aluminum Tank Truck

The Heil Co., Milwaukee, Wisconsin, has developed an all-aluminum tank truck for the transportation of food and chemical products. The trailer is believed to be the first aluminum tank designed for pressure unloading. It was designed specifically to haul such products as fertilizer solutions and petroleum products.

•

Hub States Catalog

A 56-page catalog of pesticides is being offered by Hub States Chemical Co., Indianapolis, Ind. The illustrated catalog contains suggested mixing and application information and covers insecticides, rodenticides, and herbicides.

Potts Mist Blower Folder

S. Frederick Potts, Crawford, Miss., has prepared a folder to describe his P-24 model mist blower. Among features of the machine are durability, compactness, and a wide range of uses.

The standard machine is equipped with a three-hole outlet and a 33-gallon spray tank. The folder is available from S. F. Potts at Box 51 in Crawford.

•

Gorman-Rupp Pumps Bulletin

The Gorman-Rupp Co., Mansfield, Ohio, has prepared a bulletin that lists the recommended pump for handling various fertilizer solutions. Eight models — flexible-coupled and pedestal mounted basic units — are described

•

Multiwall Packaging Guide

A 16-page "Multiwall Packaging Guide" containing information on the basic types of multiwall bags, the principal types of closures, proper storage and handling, loading systems, and multiwall packaging equipment is being offered by Bemis Bro. Bag Co., St. Louis, Mo.

•

Revised Dorr-Oliver Booklet

Dorr-Oliver's 16-page brochure, "Continuous Processing," Bulletin No. 7004, has been newly revised to illustrate and list the characteristics and applications of 55 types of continuous processing equipment. Also described is pilot plant equipment. The booklet is available from the company at Stamford, Conn.

•

Batch Formulating Plant

John Williamson & Sons, Inc., Whittier, Calif., is offering a new batch formulating plant for pesticide granules. Package-type plants, the new units furnish all equipment for mixing, liquid injection, screening, and packaging. They are available in several sizes.

Niagara Ethion Bulletins

Two brochures about Ethion — one dealing with use of the material for onion maggot control, the second concerning its application on beans — are being offered by the Niagara Chemical Division of Food Machinery and Chemical Corp., Middleport, N. Y. The bulletins describe the types of Ethion formulations that are available and tell how to use them.

•

Kraftpacker Brochure

Kraft Bag Corp., New York, has issued an 8-page brochure describing its Kraftpacker automatic open mouth bag filling machine. Kraft is the multiwall bag manufacturing subsidiary of Gilman Paper Co. and is exclusive sales agent for the Kraftpacker.

The brochure reports that the Kraftpacker will bag 400 to 500 tons of free-flowing materials in an 8-hour day, with an accuracy of 4 oz. plus or minus per 100 pounds.

strongest and most efficient spreader body ever built!

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NUTRAMIN
the only water soluble blend of
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Raymond MPS Bag

What has been described as the features of an independent polyethylene tube and a multiwall paper shipping sack has been accomplished by Raymond Bag Corp., Middletown, Ohio.

The new bag, designated MPS (Multiwall Perfect Seal) by Raymond, combines a complete seamless polyethylene tube as part of the first practical combination of paper and polyethylene extending above the sew-line to give a perfect seal. The result is the protection of polyethylene with the strength of multiwall.

•

Processing Equipment Catalog

The availability of a four page, illustrated catalog of materials handling and processing equipment has been announced by The Young Machinery Company, Inc., Muncy, Pa. Designed to provide a quick but comprehensive view of Young Transvair pneumatic systems and Robinson unit machines, bulletin 102 is handy for reference purposes.

Shown and described are Transvair pneumatic conveying systems and components such as pumps, blowers, feeders and cyclones; horizontal mixers; knife cutters; saw tooth crushers; gyro sifters; and attrition mills.

MW AGRONOMISTS

(*From Page 37*)

suggests that this may be somewhat of an overestimate for the state as a whole. First year corn following a legume requires little or no fertilizer nitrogen."

Once the basic fertility needs of a corn field have been met, about 30 to 40 pounds of phosphate and potash (P_2O_5 and K_2O) per acre would be needed annually for optimum yields, he indicated.

"With new high analysis fertilizers, this might be put on the row each year to act as a starter," Pesek said. "Its residues and plant residue would become part of the general soil supply for following years. Particular attention would need to be paid to the pH (acidity) and to liming where high nitrogen rates are used on some soils."

Discussing the hazards of growing continuous corn, Pesek said that while there is no serious plant disease threatening Iowa growers at the present time, continuous corn "invites" a build-up of soil-borne disease and growers will have to remain alert for signs of damage.

Further, he noted that the growing of a single crop tends to concentrate the demand for labor and equipment and to increase the risk of financial loss in case of either a crop failure or a low price for corn.

"On many farms, however, there may be an opportunity to increase the intensity on the more level land, while decreasing the effort and intensity on the more rolling portions of the farm." he suggested.

"Such a shift would tend to lower the costs of producing corn and hay and tend to overcome the risks. Total farm product would increase, since the low-yielding oat crop would occur less frequently, if at all."

Continuous Corn Growing Trend

DR. John T. Pesek, Iowa State University agronomist, reported that "an increasing number of Iowa farmers on nearly level soils can be expected to adopt continuous corn growing. Yields of continuous corn have averaged about as high as rotation corn in tests at six University farms over the past six years,—and average yields at the six locations were 91 bushels per acre for rotation corn and 90 bushels for continuous corn."

Average corn yields increased from 29 to 96 bushels per acre in the 1953-1960 period, from the use of 160 pounds of nitrogen and 60 pounds each of phosphate and potash (P_2O_5 and K_2O), Pesek stated. Eighty pounds of nitrogen with the phosphate and potash gave 82

bushels. But the same amount of nitrogen without the other two nutrients, yielded only 74 bushels.

"Most of the work with continuous corn has been on more or less level areas of medium-textured soils," he said. "Continuous cropping to corn should not now be attempted on moderate-to-steep sloping areas of more than 5 per cent slope. It is not feasible to control erosion with commonly used cultivation practices."

Kansas Fertilizer Trends

REVIEWING fertilizer trends in Kansas, F. W. Smith, Kansas State Univ. agronomist indicated that expansion of irrigation could result in a 50 per cent increase in nitrogen use in the next 15 to 20 years. It is estimated that about 2 million acres may be under irrigation by 1975-80.

"Assuming that half of this acreage were devoted to corn or grain sorghum production and also that it was fertilized according to research findings, the nitrogen consumption on irrigated land might amount to 50,000 tons per year."

He reported that fertilizer research aids the acceptance of new materials by farmers, citing ammonium phosphate grades of fertilizer, nitrogen solutions and anhydrous ammonia as examples of how research and education by Kansas State University had encouraged farmers' use of these fertilizers.

Dr. Smith said that high analysis 16-48-0 ammonium phosphate fertilizer is at present in a good position to become the Number 1 grade in Kansas. Its advent has introduced a new era in Kansas fertilizer sales.★★

ESA MEETING

(*From Page* 43)

—about 860 lots of unauthorized material every day. In the process, with assistance from other agencies and industries, they examined 139,415 aircraft, 60,394 vessels, 82,815 cargo importations of plant material, 22½ million vehicles from Mexico, 22 million pieces of baggage, and some 38 million mail packages.

Plant quarantines which are dependent upon scientific research, also contribute to the total knowledge of many new species, their geographic location, and their hosts. Technical quarantine manuals are helpful guides to others in pest control fields. Surveys abroad have contributed new knowledge on pest distribution.

The objectives of individual plant pest control programs differ widely, depending on the pest and the problem, Frank A. Soraci, director, division of plant industry, State Department of Agriculture, Trenton, N. J., told the group. For instance, Mr. Soraci said, money in New Jersey for the Japanese beetle control program is devoted to limiting the spread of the pest. Individual home-owners, gardeners, and farmers carry out all control measures. Mr. Soraci

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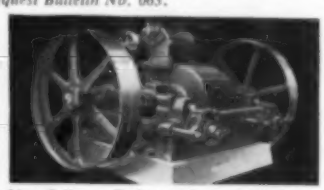
Sturtevant crushing and grinding machinery answers the long life top-load production problem for medium to small size plants. Many Sturtevants have been operating above rated capacities for more than 25 years, and *without a major repair.*

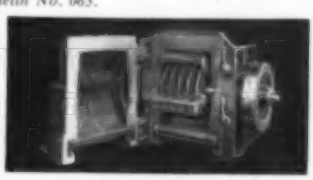
"Open-Door" design gives instant accessibility where needed — makes cleanouts, inspection and maintenance fast and easy. Machines may be set up in units to operate at equal quality and capacity.

Jaw Crushers — Produce coarse (5 in. largest model) to fine (⅛ in. smallest model). Eight models range from 2 x 6 in. jaw opening (lab model) to 12 x 26 in. Capacities to 30 tph. All except two smallest sizes operate on double cam principle — crush double per energy unit. *Request Bulletin No. 062.*

Rotary Fine Crusher — Reduce soft to medium hard 3 to 8 in. material down to ¾ to 1¼ in. sizes. Capacities up to 30 tph. Smallest model has 6 x 18 in. hopper opening; largest, 10 x 30 in. Non-clogging operation. Single handwheel regulates size. *Request Bulletin No. 063.*



Crushing Rolls — Reduce soft to hard 2 in. and smaller materials to from 12 to 20 mesh with minimum fines. Eight sizes, with rolls from 8 x 5 in. to 38 x 20 in.; rates to 87 tph. Three types — Balanced Rolls; Plain Balanced Rolls; Laboratory Rolls — all may be adjusted in operation. *Request Bulletin No. 065.*



Hammer Mills — Reduce to 20 mesh. Swing-Sledge Mills crush or shred medium hard material up to 70 tph. Hinged-Hammer Pulverizers crush or shred softer material at rates up to 30 tph. Four Swing-Sledge Mills with feed openings from 6 x 5 in. to 20 x 30½ in. Four Hinged-Hammer Pulverizers with feed openings from 12 x 12 in. to 12½ x 24 in. *Request Bulletin No. 084.*

**Reports Manager W. Carleton Merrill concerning Sturtevant Swing-Sledge Mill at James F. Morse Co., Boston.*

STURTEVANT
MILL COMPANY
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spoke as a member of a symposium on the contributions of pest control programs to the agricultural economy.

The need for a strong plant quarantine program was discussed by G. F. Callaghan, Plant Quarantine Division, ARS, Washington, D. C., who pointed ont that many of the major insects and diseases in this country are of foreign origin. "More recent arrivals," he said, "such as golden nematode, khapra beetle, and melon fly, are evidence that pests still can enter the United States despite quarantines.

"Last year, plant quarantine inspectors halted a serious plant pest every 17 minutes at our borders," Dr. Callaghan said. "The problem is getting larger each year," he continued, "because of the constant improvement in transportation facilities that move more and more people faster and farther. In addition, the opening of the St. Laurence Seaway has added 2,000 miles of seacoast to the United States."

Louis G. Davis, Plant Pest Control Division, ARS, Washington, D.C., said that better detection of insect pests that manage to get by the quarantine inspectors can best be achieved by increasing the emphasis on the detection phase of all surveys. He said that the Plant Pest Control Division is, in this regard, offering a number of books, films, slides, etc., to encourage insect detection. "We must steadily improve our procedures for evaluating potentials of, and properly identifying, detected insect pests," he said.

Control of insects is vital to the well-being of the United States, stated W. G. Cowperthwaite, State Plant Board, Gainesville, Fla., in a paper read by Hal Jones, assistant plant commissioner for the Florida Plant Board. Planning for control depends upon what entomologists can find out about a vital spot in an insects make-up, the paper declared. Dr. Cowperthwaite added that insects will be easier to control when control methods are developed that will not effect the American people in any way and disrupt their comfort. ★★

DUST FILTERS

(*From Page* 68)

working at Smith-Douglass Company, Inc., Saginaw, Michigan, determined that the most important factor conducive to satisfactory operation of cloth dust filters is the air-to-cloth ratio; that is, the relation of the number of cubic feet of dust-laden air per minute that pass through a square foot of filter cloth. A second and major factor is the type of filter bag used.

Keeping the air-to-cloth ratio low resulted in more dust dropping directly into the dust filter hopper and, consequently, less adhering to the bags. In addition, because of the low air velocity, the dust particles were not driven into the cloth fabric, where they would become more difficult to dislodge. Thus the bags could be effectively cleaned by the dust filter's shaking mechanism, preventing crusting, blinding and eventual destruction of the bags.

The Sly report indicates that the air-to-cloth ratio should not be more than 2.4 : 1. In other words, the dust filter should have one square foot of net filtering cloth for each 2.4 cubic feet of air per minute entering the dust filter. A filter handling 9,000 CFM, for example, would have a minimum of 3,750 square feet of filtering cloth.

With regard to the type of filter bag, they report that cotton cloth flat bags are most satisfactory. That bag life is about three years. In checking use of synthetic fibre bags, they report that on present fertilizer installations employing this type cloth, bag life never exceeded three years. Since synthetic bags are considerably more expensive than cotton bags, to approach the economy of a cotton bag, the synthetic would have to last at least twelve years.

Their investigation of tubular bags showed a considerably higher velocity as the air enters the tube,

resulting in wear at a point 10 to 18 inches above the connection to the dust chamber.★★

MIST BLOWER

(*From Page* 59)

mally, the fifty to fifty-five foot trees require thirty to thirty-five gallons of conventional dilute spray per tree. In concentrate spray application, one uses five-sixths as much pesticide and one-twelfth as much water per tree as for the conventional hydraulic sprayer. In other words, a tree that requires one pound of pesticide and thirty gallons of conventional full dilution spray would receive five-sixths of a pound of pesticide and two and one-half gallons of concentrated spray mixture when applied by mist blowers. Trees twenty-five to sixty feet in height require one to three gallons of concentrated spray per acre.

Some operators prefer to drive down the middle of a row and treat the pecans from two opposite sides of the row, while others drive completely around each tree. The latter procedure is more thorough but it requires about one-third more time.★★

SPRAY SCHOOL

(*From Page* 56)

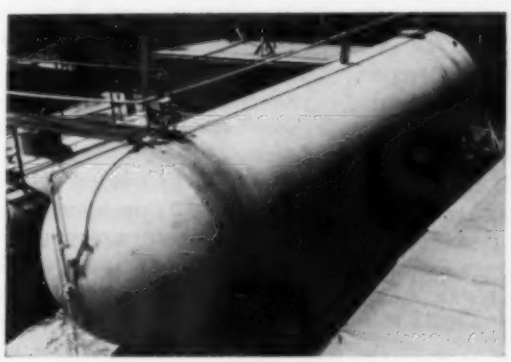
presented by A. L. Lang, professor of soil fertility, U. of Illinois, who said that recent widespread sales promotion has influenced many farmers to buy and use molybdenum in Illinois and surrounding states during the past few years. A survey of 196 farmers who treated soybean seed in 1960, he reported, showed the following results: 47 reported yield increases due to the treatment; 63 reported no differences; and the rest reported that they could make no fair comparisons, generally because they had treated the whole field and left no checks. The increases, where reported, averaged from ½ to 4 bushels per acre.

With one exception, the results of field trials on six experimental fields in southern Illinois during 1960 showed neither a positive nor a negative effect of the molybdenum treatment on soybeans, Mr. Lang reported. In the exception, he continued, all plots showed a consistent yield increase averaging about 3 bushels per acre. In summary, Mr. Lang said, information available at this time does not favor the possibility of any widespread response to molybdenum treatment by soybeans on Illinois soils. However, he added, the data are not sufficient to make positive specific and detailed local recommendations.

Proper seedbed preparation, followed by timely cultivation, will control weeds in soybeans, W. O. Scott, professor of crops extension, U. of Illinois, pointed out. In this method of control, he continued, timeliness is extremely important since if weather or some other factor prevents cultivation at the proper time, especially when weeds are small, weeds will become firmly established and soybean yields will be reduced.

The use of pre-emergence herbicides, he said, provides some insurance against the adversities of the weather, but it also is dependent on weather conditions. Fortunately, however, the kind of weather that prevents timely cultivation also is the kind needed for good weed control by pre-emergence chemicals. The FDA has approved Randox, Alanap, and CIPC for pre-emergence weed control in commercial soybeans, he said. Randox is seldom injurious to the germinating soybean, Mr. Scott reported, and is first choice where grasses are the predominant problem.

Alanap controls annual grasses and most broadleaf weeds, he continued, but it seldom controls annual smartweed, which is a common weed in soybean fields. To overcome this disadvantage, he



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said, a few states have suggested a mixture of Alanap and CIPC.

Figures presented by H. B. Petty, professor of agricultural entomology, revealed that the use of fertilizer-soil insecticide mixtures has decreased sharply in Illinois during the past four years, while the use of granules has increased correspondingly. In 1957, soil insecticides were applied in fertilizers on 71 per cent of the treated acreage in Illinois and the soil insecticides were applied as granules on six per cent of the acreage. The remaining 23 per cent was covered by sprays. The figures for 1960 indicate that sprays are holding their own, but soil insecticides in fertilizer were used on only 29 per cent of the acreage while granules were used on 48 per cent of the land treated.★★

ORTHO PLANT

(From page 31)

combustion gas and delivered to the storage tanks. The spent gas, consisting primarily of nitrogen is reheated as previously mentioned, and is then used to drive the expansion turbine, thus furnishing a large portion of the required operating power of the plant.

The complex pelleted fertilizer plant will produce UNIPEL pellets. Ground phosphate rock is acidulated with nitric acid in a series of specially designed reactors. The acidulation yields a fluid slurry consisting of a solution of soluble compounds of P_2O_5, calcium nitrate, and minor amounts of other soluble salts, carrying the insoluble components of the phosphate rock in suspension.

Phosphoric acid is added to the slurry, reacting with part of the calcium to make all the P_2O_5 available as plant food. Finally, anhydrous ammonia is added to the train to neutralize the mass and to establish the final balance of the binary relationship, nitrogen and P_2O_5.

In the final product, most of the nitrogen is in the form of ammonium nitrate. The P_2O_5 appears as a mixture of dicalcium phosphate, ammonium phosphate, and monocalcium phosphate, in proportions which may be varied by formulation. When it is desirable to include it in the formula, potash is added to the slurry in a final mixing vessel. From this vessel the slurry flows by gravity to a tank. Pumps then take the slurry and force it through nozzles into a drying system known as a "spherodizer." The spherodizer is patented by the Chemical and Industrial Corporation and permits granulation and drying to be performed in one rotary drum. Thereafter, the material is screened and any fines and crushed oversize are returned to the process. The product, a sharp narrow cut of substantially spherical pellets, free of oversize and fine material, is cooled before being sent to storage. As a final step, those formulations containing high percentages of ammonium nitrate are given a coating, similar to the treatment of ammonium nitrate prills, which assures continuing good physical properties during storage and free-flowing characteristics through fertilizer applicators.

A fourth division of the Fort Madison operation will be the ammonium nitrate plant with capacity to produce from 150 to 200 tons of prilled ammonium nitrate daily. This plant employs the conventional neutralization of 57% nitric acid with anhydrous ammonia at atmospheric pressure. The resulting 83% ammonium nitrate solution is concentrated in an evaporator to less than 0.25% moisture content. The molten ammonium nitrate is prilled in a short prill tower. Cooling, screening and coating operations follow, producing a dense, free-flowing, spherical product.

Construction contracts for the complex plant, the nitric acid plant and ammonium nitrate plant have been awarded to the Chemical and Industrial Corporation, Cincinnati, Ohio.

William M. Miller, of the parent Standard Oil Company of California, has been appointed manager of the new plant. O. R. Vasak has been appointed plant superintendent and Dr. Leo Orth will be manager in charge of fertilizer sales.

The new Ortho plant will serve the middle western and northeastern states.★★

CACA MEETING

(From page 47)

plied, supply the necessary information to result in the responsible use of pesticides in the home and in agriculture. The primary ingredient which is lacking, he said, in our informational program is a coordination between all agencies and industries which are exerting efforts in this direction. If all approaches are coordinated through a joint effort, he continued, tremendous advances can be made in the prevention of poisoning as well as in the understanding by the public of the nature, use, and benefits of chemical pesticides.

Fitzgerald Elected

B. J. Fitzgerald, Shell Chemical Co., Boulder, Colo., was elected president of the Colorado Agricultural Chemicals Association at the annual meeting. He succeeds E. H. Macomber, American Cyanamid Co., the 1960 president. G. Harold, Stauffer Chemical Co., Arvada, Colo., was elected vice president, and D. Sjoquist, Niagara Chemical Division, Boulder, was elected secretary-treasurer.

Agricultural chemicals play a very important part in the program of quality control practiced by the canning industry, Ben F. Counter, Fort Lupton Canning Co., Fort Lupton, Colo., told the group. Mr. Counter said that he can recall the days when the problem of removing bean pods that had been damaged by insects and disease from the inspection tables was one of the principal concerns of canners. Now, he continued, many of the women employed to inspect raw produce actually would

not know what to look for in the product now being received by canners. Truly a remarkable job has been done, he said, in putting out a product which not only is pure and clean, but more wholesome, nutritious, and appetizing.

R. L. Horst, chief, Denver district, Food and Drug Administration, spoke on the Miller Amendment. He said that the sponsors of pesticide use have primary responsibility for determining whether proposed uses leave residues, and if they do, whether they are safe and justify the establishment of formal legal tolerances. He added, however, that growers have the responsibility of determing what pesticide uses are proper for their purposes and must follow those uses so that they end up with crops that do not contain excess residues of pesticides.

Growers must understand, he said, that it is not safe for them to experiment with new pesticides on crops. They should use the materials according to label directions or officially recommended schedules — on the crops specified, in the amounts specified, and at the times specified.★★

HERBICIDE SALES

(From page 45)

Slightly higher prices plus greater acceptance of granular materials in 1960 were responsible for showing a greater share-of-market despite a decline in the proportion of acres treated.

Brand C is an excellent example of how management can quickly readjust its marketing effort when it has the facilities to measure accomplishment. Note that, in 1959, market share of Brand C declined slightly. With nothing else for guidance, management would probably not have become alarmed *since the 3.7% in 1959 was actually an increase in dollar sales over the 4.3% in 1958.* With the knowledge of market conditions, however, immediate steps could be taken to regain lost share-of-market. In this respect, it is significant to note that it is easier to recoup product losses immediately than to discover the situation after definite downward trend is established and then attempt a "come-back." In today's changing agriculture, *the market belongs to those who know it.* Protection of current product investments cannot be maintained through hunch and guesswork. The penalty for lack of effective distribution is too great for the manufacturer to be guided by inadequate market information.

Thus, we find that more and more successful companies that sell to the farmer are paying increasing attention to obtaining and interpreting continuing market data that allow more intelligent decisions. This trend, which has long been established in consumer marketing, will surely increase rapidly in farm marketing as distribution methods and product characteristics become more complex.★★

DRIFT

(From page 35)

agricultural aircraft industry and, to a lesser extent, ground applicators may have to reconcile themselves to foregoing many of the jobs they have performed in the past, and have accepted as standard practice, because they are now incompatible with the requirement of no residue on neighboring crops.

There are a number of precautions that pilots might take to reduce their risks from drift. They should not work in a strong wind or excess calm. Pesticides should never be applied upwind from a neighboring crop where residue would be a problem. Work near houses, schools, subdivisions, or highways should be avoided. Also, chemicals that contaminate milk should be avoided and sprays should be used instead of dusts. It is evident that if an operator avoids all these things he won't be running as much of a risk, partly because he won't be doing so much work.

Perhaps it might be well for aircraft operators to consider expanding their agricultural services and provide application by ground rigs which can be used in many places where aircraft cannot be used. Some jobs might best be done by using both — using a ground rig to treat portions of the field near critical areas and using aircraft on the balance where its disadvantages do not exceed its ad-

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vantages. Perhaps operators should look forward to providing a well-rounded pest control service and not merely provide aircraft work.

Possibly some steps toward a solution of the problem might be taken by manufacturers of pesticides. Formulation of more pesticides as sprays instead of dusts would help. Perhaps the excessive dustiness of dusts might be reduced. Theoretically, it seems possible that the fine particles could be removed or conglomerated, reducing drift and perhaps improving the effectiveness against the pest. The use of oiled dusts has promise. Pesticides with short-lived residues also present fewer problems. Pesticides that do not come through into milk can probably secure tolerances that would permit residues on forage and reduce the troubles arising from drift.

Possibly manufacturers of equipment might develop sprayers that would yield a narrow spectrum of uniformly coarse sprays without the fine droplets that drift so far. Possibly farmers might help by some kind of agricultural zoning whereby crops with incompatible pest controls would not be grown side by side.

Although some help might come from manufacturers of pesticides and equipment, or from farmers, it probably would be more profitable to acknowledge that the problem essentially is one that must be faced by the applicator—and, since aircraft apply most of the pesticides in California, it is a problem that must be solved by or for the agricultural aircraft industry.★★

PRENEUTRALIZER

(From page 40)

to aid granulation, and to prevent internal clogging from wet process phosphoric acid. Neither the phosphoric acid, nor the small amounts of sulfuric acid bypassed create an ammonium chloride fume cloud problem.

Another improvement is the replacement of the discharge pipe with ½-inch drilled holes, with a block sparger.

The block sparger is an adaptation of a design by Spencer Chemical Co., which was described in the 1959 Fertilizer Round Table Proceedings. The Spencer block assures uniform distribution of fluids. Its deep slots corrode more slowly than thin drilled orifices, and its use has so greatly reduced clogging that at one of the Davison plants, the air purge system was completely removed, Mr. Alfrey reported. ★★

FEEDING SYSTEMS

(From page 49)

change from a liquid condition to the flowable solid condition without breaking stride. This is why we think of the restriction between the large hopper and the small hopper as a differential producer. Should the material break out of an arch in the big hopper, it becomes fluidized and then runs through the small hole as a liquid. However, the difference in pressure tends to slow it up in the small hopper to the point where it reverts again to the state of a solid and can be supported by the walls of the hopper and not create a static head as if it were liquid.

Phosphate rock dust is truly a challenging material but it can be tamed.★★

BARTER

(From page 33)

by the Communist countries, it is believed that the free world will increasingly recognize how important a weapon barter transactions can be in the economic cold war.

But — with all its pitfalls — we must be reconciled to a continuation of barter and controlled trade. The newest states such as the African countries, which recently achieved independence are probably not prospects, as yet, but will have to depend on outright loans for a while. But as they become truly emergent nations, there will be a period when lack of foreign currency will underscore the appeals of controlled trade. Thus these newest nations, too, in their turn will help revive the oldest trade technique of all, barter, and its not quite identical twin, the clearing account.★★

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JOHN F. MULVEHILL, for the past five years Fertilizers Materials Specialist for Minnesota Farm Bureau Service Co. of St. Paul, has been named sales manager of the company's fertilizer division. The company has fertilizer plants in Moorhead, Dodge Center, Fairmont, Benson, and Clarkfield, Minn.

AC

RICHARD J. PRICE has joined Chase Bag Co., Chicago, as chief industrial engineer. He had been with Continental Can Co.

AC

JOSEPH L. KEEFE has joined American Potash & Chemical Corp., Los Angeles, Calif., as a market development representative.

AC

HORACE W. LEE has retired from Niagara Chemical Division of Food Machinery and Chemical Corp., Middleport, N. Y., after 41 years of service.

AC

HAMPTON A. LYNESS has been appointed as a district sales manager for the Chipman Chemical Co., Chicago. He had been assistant district manager for the company's Chicago division. In his new position, he will serve Nebraska, Kansas, Iowa, and Missouri from headquarters in Kansas City.

AC

F. S. ROYSTER GUANO CO., has named Ross H. Walker sales representative to cover the West-Central portion of Alabama.

LISTENING POST

(*From Page* 67)

seed must be stored before planting, treatment might be beneficial. Materials tested were manganese ethylene bisdithiocarbamate (maneb), an antibiotic formulation containing 15% streptomycin and 1.5% oxytetracycline plus inert ingredients (Agrimycin), and a mixture of maneb and the antibiotic. Line and Eide found that maneb and the maneb-antibiotic mixture were equally effective and that both gave better protection against decay than the antibiotic alone.★★

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PEST ROUNDUP

(*From Page* 62)

Bridger National Forest, Wyoming, continues severe and poses a threat to additional spruce stands adjoining the main body of the infestation. Vigorous action is underway to reduce populations and forestall additional loss to the forest resource.

The Douglas-fir beetle is reported active throughout the Douglas-fir timber types in the Intermountain and northern Rocky Mountain states. In the latter area, infestations are scattered over more than 400,000 acres and tree-killing is severe in many places. In the Intermountain states, outbreaks of serious proportions, with many epidemic centers, occur on the Sawtooth National Forest, southern Idaho, and on the Dixie National Forest, southern Utah. Tree-killing by the Douglas-fir beetle is expected to continue unabated in 1961 due to the lack of suitable methods for control.

Many infestations of spruce budworm throughout Montana continued in epidemic status during the year and some 3½ million gross acres of fir timber was defoliated, ranging from light to severe. The spruce budworm remains the most important defoliator in Idaho but populations currently are lower, and damage is less severe, than in the past several years.

One or more species of tussock moths were reported on various brush and tree species at scattered locations in Idaho, Nevada, and Utah. One infestation in central Idaho covered an area of approximately 50 square miles; another near Carson City, Nevada stripped bitterbrush over a large area. On Wheeler Peak, also in Nevada, an infestation occurred on 5,000 acres of white fir timber and the same

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tree species was defoliated on Highland Peak, near Pioche, Nevada. All infestations were infected to one degree or another with virus diseases and it is expected that natural factors will reduce populations in all areas to tolerable levels.

The larch casebearer, first discovered in the western states at a point near St. Maries, Idaho in 1957 was reported now to have spread over practically all of northern Idaho and parts of eastern Washington. Inasmuch as the casebearer is relatively new to this area, and is attacking a different host than it does in the eastern states, there is considerable interest of biological control by introducing parasites into the infestation. Accordingly, large numbers of casebearer parasites were released in the vicinity of St. Maries in June.

Active infestations of pandora moth were reported on about 15,000 acres of lodgepole pine in northeastern Utah. This forest pest, with a two-year life cycle, caused little damage to host trees in 1960. However, feeding by the larger larvae in 1961 could cause heavy defoliation in the affected area and stripped trees may be killed.

The lodgepole needleminer has increased in severity in the lodgepole pine forests of the Intermountain states for the past four years and infestations were reported as epidemic on over 200,000 acres in 1960. The largest infestation occurs in the Targhee National Forest, Idaho, in the center of a large commercial stand of lodgepole pine. Artificial control has not been attempted.★★

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ALVIN J. COX, Ph.D.
Chemical Engineer and Chemist
(Formerly Director of Science, Government of the Philippine Islands. Retired Chief, Bureau of Chemistry, State of California, Department of Agriculture.)
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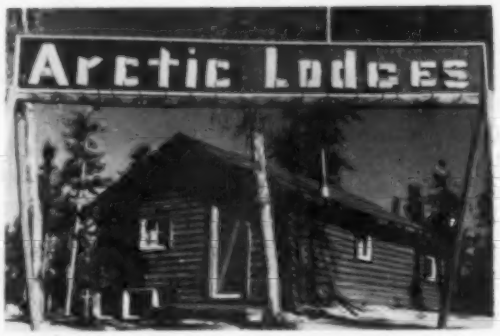

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CLASSIFIED ADVERTISING

Address all classified replies to Box Number, c/o Agricultural Chemicals, P. O. Box 31, Caldwell, N. J.
Rates for "Help Wanted" advertisements are 20¢ per word; minimum charge $3.00. Rate for individuals seeking employment is 5¢ per word, $1.00 minimum.
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MERRILL M. PARSONS has joined International Minerals & Chemical Corp., Skokie, Ill., as agricultural market analyst. He had been assistant director of marketing for the American Meat Institute, Chicago.

AC

RICHMOND M. STAMPLEY has been appointed sales manager for West End Chemical Co., division of Stauffer Chemical Co., San Francisco, Calif. He had been manager of sodium sulfate and salt cake sales.

AC

F. S. ROYSTER GUANO CO., Norfolk, Va., has appointed Ralph D. Johnson sales representative in northwestern Ohio, succeeding James V. Wilson.

AC

J. T. PARKERSON JR. has been named assistant general manager at the East Point plant of Tennessee Corporation.

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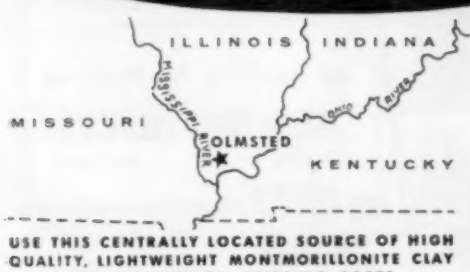

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Producing Phosphoric Acid

Allied Chemical has begun production of phosphoric acid from new facilities located at the East St. Louis, Ill., works of its General Chemical Division.

The plant, with a projected capacity of 50,000 tons per year of wet-process acid, will primarily supply fertilizer manufacturers serving midwest agriculture. According to the company, the new plant will produce "a truly green wet process acid of finer quality than any previously available." This higher quality, it is reported, results from the use of new processing techniques together with selected raw materials, including virgin quality sulfuric acid.

•

Revised Tolerance Folder

United-Heckathorn, Richmond, Calif., has issued its revised, wallet-sized tolerance folder that gives the latest limitations on the use of 45 pesticides. The folder is available from the company at 600 S. 4th St., Richmond.

This Month's Cover

PHOTOS from the two grand prize winning sequences at the Insect Photo Salon of the annual Entomological Society of America convention, Nov. 28 to Dec. 1, at Atlantic City, N. J., are among those on this months cover of *Agricultural Chemicals*. Also shown, as representative of the type of individual photographs displayed, are two pictures (top and bottom) by Ray R. Kriner, chairman of the Photo Salon. Top photo shows a soldier subterranean termite and bottom photo is of a cicada adult.

At the left center, two stills from the grand prize winning series of ten slides on the Black Swallow Tail Larvae, by Robert Strindberg, West Hartford, Conn., are shown. In these pictures, the black swallow tail larva is wiggling out of its skin and going into the chrysalis stage, in which it remains for 11 to 12 days. Then emerges the beautiful black swallow tail butterfly.

At the right center, two photos from the other grand prize winning sequence – "A Pentatomid, Deposition and Eggs," by Alvah Peterson, Columbus, Ohio—are shown. Top photo shows a female pentatomid depositing a cluster of 14 red eggs on a bean pod. In 5 to 7 days these eggs hatch and the nymphs push off the caps of the eggs with brown, T-shaped egg bursters. The red color of the eggs is caused by the red color of the nymphs within. The empty egg shells have a greenish-white color.

A complete survey of the chemical fertilizer industry . . . .

THE CHEMISTRY AND TECHNOLOGY OF FERTILIZERS

edited by VINCENT SAUCHELLI, Chemical Technologist, National Plant Food Institute.

ACS Monograph, 1960, 704 pages, $18.00

LEADING AUTHORITIES in the field discuss the raw materials used in chemical fertilizers and the conversion of these materials to suitable chemical compounds for the feeding of crop plants.

Broad in scope, accurate, completely up-to-date, this book will be of special value to chemists, chemical engineers, plant superintendents, and to management charged with the responsibility of selecting efficient and economical processes for the production of fertilizers.

CONTENTS: The Fertilizer Industry of the United States; Nitrogen; Phosphate Ore; Phosphate Rock; Normal Superphosphate; Manufacture of Triple Superphosphates; Wet-Phosphate Acid Manufacture; Diammonium Phosphate as Produced at By-Product Coke-Oven Plants; Operating Techniques, Equipment and Practices in Manufacture of Granular Mixed Fertilizers; Manufacture of Concentrated Water; Nitrophosphates and Miscellaneous Phosphataes; Thermal Processes for Producing Phosphate Fertilizers; Potash Occurences, Processes, Production, Plan Practices in the Manufacture of Nongranulated Mixed Fertilizers; Fertilizer Materials; Liquid Fertilizers; Structural and X-Ray Data on Chemical Compounds Found in Fertilizers; Corrosion; Materials of Construction for Fertilizer Plants and Phosphoric Acid Service; Materials; Gaseous Effluence for Fertilizer Granulation Plants.

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AG CHEM

TALE ENDS

THE intricacies of international trade continue to astound us. We heard recently that Japanese fertilizer manufacturers can buy phosphate rock from American producers in Florida, ship it to Japan where they crush and acidulate it, then transship to Brazil where they undersell all the American producers of super. We are used to having the rest of the world undersell U. S. producers where labor costs are an important factor, but in the case of super a minimum of labor is involved. The Japanese economies would have to be primarily in equipment, power or lower freight costs. Or could it be that this is one more case where the crushing load of heavy taxes makes it impossible for the American manufacturer to compete?

Fertilizer stocks have been stellar performers in the recent stock market rise. Apparently the investment experts and the stock buying public both share a belief in the bright future of this industry which continues to set new record consumption figures year after year.

AC

J. J. Davis, former head of the Department of Entomology at Purdue, has published, in a limited edition, a HISTORY OF PEST CONTROL. *Copies are available at $3 each from Dr. Davis at his Purdue address. As one of the prime movers in the development of the pest control industry during the past 25 years, Dr. Davis speaks with the authority of one who has helped pest control grow from the mere control of a few pests, such as rats, roaches, and bedbugs, to the control of storage pests, field crop insects, diseases, weeds, and mosquitoes. Dr Davis was, among other things, responsible for the inauguration of the first Structural Pest Control Operators Conference back in 1936. We know of no one more qualified to write a history of pest control.*

AC

If anybody who has time to watch television still is in the agricultural chemicals business, they probably are familiar with two installments of a show called "Route 66" last month in which aerial applicators were featured. For the benefit of the majority, however, who missed the shows, the Arizona Aerial Applicators Association acted as technical advisors for the program. The producers, apparently convinced that while truth is stranger than fiction, fiction is more exciting, took a few liberties with the facts. Their typical crop dusting pilot earned from $25,000 to $100,000 per year, for example. In any event, crop dusters were not the villians, for a change.

AC

Our anti-Madison-Avenue-type-words campaign, announced on this page in the January issue, seems to be gathering support. Don Sanford, assistant agricultural chemicals sales manager for Dow, writes "I guess perhaps I could settle for 'food and fiber' although I'd rather not; but, I'm sure with you on the abolition of 'agribizness.'"

AC

There was so much worth while gained in conducting the "User's Panel" at the recent Fertilizer Round Table session that a second meeting of the panel was held last month in Baltimore. The panel drew up a series of suggestions, asking raw material suppliers for uniform nomenclature, uniform data for operating personnel and standard reporting procedure on analysis of raw materials. Suppliers have been advised of the need for this information and have been asked to indicate at a later session whether it will be practical to supply it.

AC

Reports from concerns that shared in the rapidly expanding market for granular pesticides, both insecticides and herbicides, last season indicate a belief that the market will be considerably bigger for 1961. Many of the formulators who marketed granular herbicides last season somewhat underestimated demand, and ran out of stocks before the season was over. They plan to estimate demand more optimistically for the new season.

Not that there weren't a few problems in connection with the use of the granulars. Some difficulty was encountered in areas where rainfall was heavy, and on light soils. But, in general, users were well satisfied with the granular formulations, and an increase in their use is expected for 1961.

A TYPICAL AGRICULTURAL CHEMICALS SUBSCRIBER TELLS

Why He Reads Agricultural Chemicals

"I feel that agriculture has a future just as bright, or even brighter, than do electronics, space missiles, or what have you. My whole life has been devoted to agriculture and, with this intense interest in the bright future of agriculture, especially agricultural chemicals, I find that the best way to keep abreast of the situation is to read. It is impossible to read everything that is available, so I have learned to depend upon AGRICULTURAL CHEMICALS *to keep me well informed. I doubt that I have missed an issue in the past six years."*

WILLIAM E. ANGSTADT
Reading Bone Fertilizer
Reading, Pa.

Reading Bone Fertilizer, Reading, Pa., was organized in 1905 for the purpose of mixing fertilizer. A rendering business was established as a source of tankage a few years later. Today, the company manufactures a complete line of commercial plant foods which it sells throughout southeastern Pennsylvania. The company also distributes a complete line of pesticides for farm use as well as feed products. Mr. Angstadt was graduated from Pennsylvania State University with a B.S. degree in Agronomy in 1950 and, prior to joining Reading Bone Fertilizer, where he now is general manager, he was associated with S. B. Penick & Co. and the Borden Co.

— Leader in the Field —

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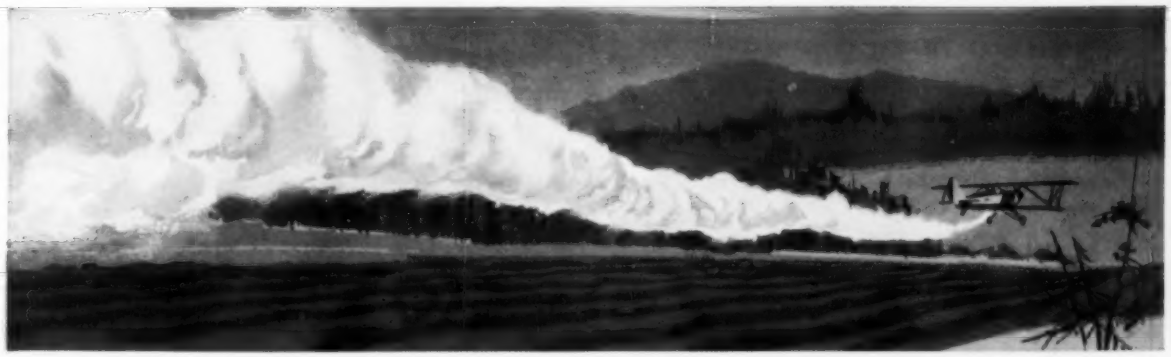

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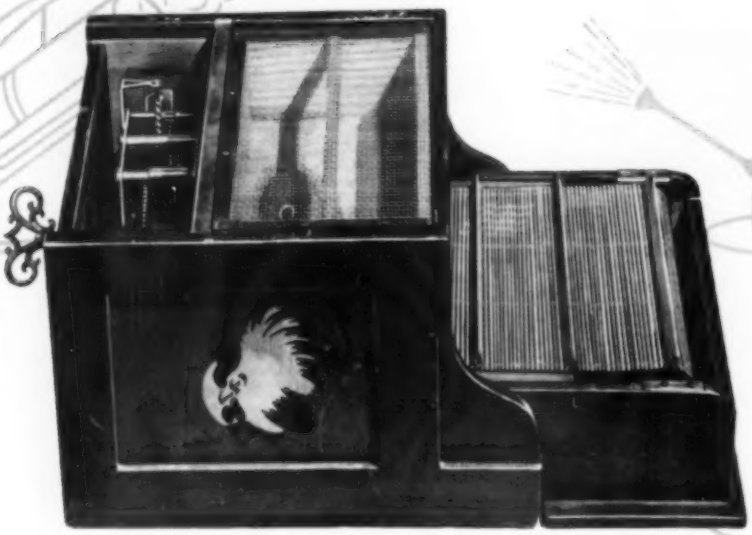

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